

NGO Green Home and WWF

Steps towards sustainable development of small hydropower plants in Montenegro

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Used abbreviation

European Union	EU
Small hydropower plants	sHPP
National action plan for renewable energy sources	NREAP
Strategy of energy development of Montenegro by 2030	Strategy
Urban-technical conditions	UTC
Spatial-urban plan	SUP
Local study of location	LSL
Department of Hydrometeorology and Seismology of Montenegro	HMSZCG
United Nations Development Program	UNDP
Power Company of Montenegro	EPCG
European Bank for Reconstruction and Development	EBRD

Summary

Hydropower is a branch of energy that is being developed for over 100 years. Hydropower facilities are used for electricity production. Hydropower plants currently produce 15.8% of the world electricity production, with 1060 GW of installed capacity. Small hydropower plants with installed capacity under 10MW represent about 10% of overall hydropower capacity in the world. Installed capacity of hydropower plants increases at annual level by 2,5%. However, with increasing knowledge about the negative impact on the environment and possibilities to reduce this impact, further development of hydropower in the world and especially in Europe is expected only in compliance with the principles of sustainability.

Montenegro began with development of hydropower in 1937. Today, hydropower plant, two hydropower plants and eight small hydropower plants produce 73% of overall electricity consumed in Montenegro. Process of a new cycle of sHPP development started by adoption of the Strategy of small hydropower plants in 2006. In the period from 2008 until today, 33 projects for construction of small hydropower plants in Montenegro were approved. Out of approved projects, 27 projects are currently being implemented on 25 watercourses, with the construction plan of 43 sHPP with overall capacity of 83 MW and planned annual production of 269 GWh. Strategy of energy development of Montenegro by 2030 as well as National Action Plan of renewable energy sources by 2020 plan dynamics of sHPP development, which predicted installed capacity by 2020 are fulfilled with current approved projects.

Process of implementation of sHPP projects is roughly divided into four phases: planning, approving, construction and exploitation. This study analyzes in details planning and approving phases. Planning phase presents strategic phase, where the country defines development guidelines, criteria for approving projects and conditions within which these projects can be implemented. In this phase, water management, energy, environmental protection and spatial planning sector should jointly define approved locations, their characteristics, manners of merging in existing and spatial plan as well as conditions within which sHPP can be constructed. Implemented phase of planning which is currently used in Montenegro is analyzed, as well as planning phase which is defined by legal frameworks. The differences between these procedures defined basic deficiencies and needs for improvement.

Approval of projects on exploitation of water resources, through concession, for construction of sHPP in Montenegro is performed in two steps: approval of concession and approval of construction. Concession is approved by using two procedures: public tender and energy permit. Since 2008, four public tenders were organized by the State of Montenegro, in accordance with the Law on concessions. By this procedure, 19 projects were approved, out of which five are terminated by termination of Concession Agreement. Procedure of energy permit, introduced as possibility for projects of sHPP with installed capacity under 1MW on watercourses of local importance is defined by the Law on Energy in 2010. Since 2010 until today, 13 projects for construction of sHPP were approved by procedure of energy permit. Approval of construction is performed in accordance with the Law on Spatial Planning and Construction, as well as other laws defining necessary approvals and permits for implementation of energy facilities (Law on Energy, Law on Water, etc.). The study analyzes and defines implemented and regulated procedure of approval phase and main differences and deficiencies.

On the basis of detailed analysis of procedures and cross section of condition of active and terminated project, as well as analysis of procedures in countries of the European Union, ten main issues were defined. These issues are listed according to the priority of the need of their solving with the aim of improving and amendment of planning procedure and approval of sHPP projects, i.e. directing development of sHPP in Montenegro towards sustainable development. Ten main issues and solution proposals are following:

1. Lack of water management basis

There are no valid water basis, water management plans, information system and water cadastres.

Solution proposal:

Prepare and adopt water basis and other water management basis as soon as possible.

2. Lack of cadastre of watercourses with environmental and energy characteristics

There is no cadastre which defines energy and environmental characteristics of watercourses and criteria for using these watercourses for construction of sHPP.

Solution proposal:

Expand existing cadastre of small watercourses with hydrological and data on condition and need of environmental protection, including environmental and hydromorphologic status of water body, in order to obtain cadastre for construction of sHPP with energy and environmental criteria.

3. Lack of annual or years-long planning of dynamics of usage of watercourses for energy purposes

Lack of documentation which defines short-term dynamics of concession allocation for sHPP location which are predicted for potential allocation.

Solution proposal:

Define the obligation to prepare development plan of sHPP for period of three years by the Law on Energy. This plan would define which watercourses are planned to be used, in which framework capacity to meet objectives of dynamics of increasing the capacity of sHPP from Strategy and NREAP.

4. Incompatibility of legal regulations or their implementation

Currently it is not clear which approvals and steps are necessary for obtaining construction permit for energy facilities.

Solution proposal:

Define and implement list of approvals required in order to approve in quality and sustainable manner the construction of energy facilities.

5. Insufficiently clear defining of responsibilities of concessionaires and grantor

Existing Concession Agreements vaguely define obligations and responsibilities of contracted parties, therefore opinions of lawyers are often requested with the aim of interpretation of contract.

Solution proposal:

Responsibilities of concessionaires and grantor should be more clearly defined in the Concession Agreement, particularly with regard to the issues that led to the termination or issues in implementation of the agreement, so far in the implementation.

6. Poor capacity of institutions responsible for management of water and energy resources

It is necessary to raise capacities of water management and energy sector in order to meet obligations defined by law.

Solution proposal:

Define short-term and long-term plan of raising capacities in the field of water management and energy, if successful and sustainable economic development is expected by using these fields.

7. Monitoring, review and quality definition of strategic objectives in the field of energy

Obligations of monitoring over implementation of Strategy and Action Plan are not implemented in accordance with the Law on Energy. While defining new objectives and deadlines in strategic document, previously defined are not reviewed.

Solution proposal:

- **Every year preparation of annual report of implementation of strategy and action plan.**
- **Forming active system of monitoring of implementation of energy strategy, if not by the government, then by the non-governmental sector.**
- **Review of current activities and defining concrete and measurable objectives of energy development, by preparation of quality and relevant five-year action plan in accordance with the Law on Energy, if the current Strategy does not change.**

8. Preventing the allocation of responsibilities/control of procedure to one institution

Clearly defined steps of procedure do not exist, i.e. criteria for approval of projects of sHPP, from the aspect of energy, hydropower etc. and methodology that is used for calculation of these criteria.

Solution proposal:

Until the adoption of cadastre, publicly available criteria for the approval of sHPP projects should be defined in the first step of approval, from the aspect of usage available waters, environmental impact and integration into existing power system.

9. Higher public involvement during planning/approving the projects

Process of defining watercourses at which construction of sHPP is planned, allocation of approval and concession for sHPP projects as well as technical solutions for utilization of water potential are non-transparent and involvement of public should be on higher level.

Solution proposal:

Prepare and adopt plan of development of sHPP on the period of three years

10. Compliance of strategic plans and harmonization of policies of energy, water management, environment, planning and construction sectors

Development of sHPP, as distribution source is not harmonized with development of other sectors.

Solution proposal:

Strategic planning of development of distribution sources and sHPP should include other sectors, as this sector should be included during defining the manners of water usage, environmental protection, spatial planning etc.

Solving these issues is obligation of state institutions responsible for energy, water management, environment, spatial planning and construction field. Non-governmental organizations, international organizations and businesses should help in order to bring water management and energy sector into the track of sustainable development.

I Hydropower – renewable energy sources and small hydropower plants

Potential energy of water is used for thousands of years for various applications. At the end of 19th century, conversion of this energy into kinetic energy to drive a turbine was linked to the use of electricity generator in order to produce electricity from water energy in hydropower plants. As the settlements and industries developed near rivers, hydropower plants were constructed near the consumer [1]. Today, hydropower plants contribute to electricity production in 159 countries worldwide, and overall installed capacity of 1060 GW produces 15,8 % of world electricity production [2].

There are different technical designs and sizes of hydropower plants. Hydropower plants are divided on accumulative, run-of-river and pumped-storage hydropower plants, depending on manner of usage of water potential. In legal framework, hydropower plants are usually divided into large and small hydropower plants, depending on installed capacity. However, this division is directly dependent on national policies, therefore there are definitions that small hydropower plants present hydropower installed capacity up to 1,5 MW (Sweden) and up to 50 MW (Canada and China). In countries of the European Union, these definitions are limited to 20 MW, while most countries define small hydropower plants as power plants with installed capacity up to 10 MW. It is important to mention that with such division, small hydropower plants can be run-of-river and accumulative type, as run-of-river hydropower of large capacity.

Hydropower is always considered safe, predictable and cheap manner of producing electricity, but knowledge about manner of reducing negative impacts on society and ecology significantly increased in the last decades. In 1990, in countries of the EU, hydropower presented 94% of overall electricity production from renewable energy sources and in 2012 presented 44 % [3] mostly due to increase of production from other technologies. Therefore, in 2012 Sweden, France, Austria and even Italy presented countries with the largest production of electricity from hydropower plants in the European Union-28[3]. The largest part of this production presents large HPP, while sHPP present about 6 % of overall installed capacity, i.e. 13,6 GW [3,4]. Countries with the largest installed capacity of small hydropower plants are Italy (2,7 GW with 2.427 sHPP), France (2,1 GW with 1.935 sHPP), Spain (1,9 GW with 1.047 sHPP), Germany (1,7 GW with 7.512 sHPP) and Sweden (1,2 GW with 1.901 sHPP).

Awareness about the need for a legal framework for improvement and maintenance the quality and usage of waters in the territory of the EU has paid off by the adoption of the Water Framework Directive (Directive 2000/60/EC). This Directive defined the need for achievement i.e. maintenance of good status of all waters, i.e. quality and continuity of streams of river basins, as well as need for adoption of river basins management plans [5]. Adoption of this Directive has led to requirement of more sustainable development of hydropower, strategic planning of dynamics of development with the aim of preservation of good ecological status of waters or achievement of good ecological potential of waters, as well as implementation of measures which reduce negative impacts on environment on already constructed hydropower plants. However, mutual non-coordination of implementation of the Directive and other directives from the field of environment and directives and policies of energy development led to complication and time vague and administrative procedures in some countries, i.e. impossibility of further development of hydropower [4].

In order to increase energy security and diversification of energy sources, energy policy of the EU focuses on more sustainable development through promotion of effective energy production, transfer and rational consumption from renewable energy sources. In accordance with the above mentioned, Directive on encouraging renewable energy sources was adopted in 2009 (Directive 2009/28/EC) which obliges member countries of the EU to the national objective of renewable energy sources share in overall energy consumption by 2020. This directive defines obligation of adoption of NREAP by which member states define technologies that will use to achieve national objective, as well as dynamics of their implementation. In accordance with the submitted NREAP of member states of the EU from 2010 and 2011, share of sHPP in overall electricity production from renewable energy sources will reduce from 8 to 5%. The percentage reduction in the share of sHPP is mostly due to higher planned development of usage of other technologies. Defined in amounts, which means that in the period by 2020, increase of installed capacity from sHPP for about 6 GW is planned, out of which 1.405 MW from sHPP of installed capacity up to 1 MW and 5.694 MW from sHPP from 1 to 10 MW [4,6].

At the global level, installed capacity of hydropower plant is constantly increasing of 2,5% annually. Although this increase seems small compared to other technologies, from 2008 to 2012 new capacities of hydropower plants have produced as much electricity as all other technologies that use renewable energy sources [1]. It is expected that hydropower will be developed in developing countries in further period. Further development of hydropower in Europe is expected in three main directions:

1. Better management of production from existing reservoirs in order to improve contribution of peak consumption,
2. Identification of new locations for reversible hydropower plants that help in better balancing of production from intermittent producers in order to allow further increase in share of renewable energy sources and
3. Implementation of concept of distributed production where small hydropower plants could complement work of solar power plants and wind power plants [7].

So, hydropower has its place in further energy development, with implementation of existing measures and technologies that reduce its impact on environment. Policy of the EU insists on strategic planning of energy development and usage of natural resources, where integrated planning of hydropower and environmental protection presents the only manner of sustainable development of small hydropower plants [1,7,8].

II Small hydropower plants in Montenegro

Montenegro is country rich in natural resources, including the water. Due to the topographic characteristics of terrain interlaced with rivers, Montenegro is abundant in hydrological potential, which is estimated at 10TWh as theoretical potential [9].

Electrification of Montenegro started in 1910 in Cetinje, but first hydropower facilities, small hydropower plants Podgor (0,4 MW) and River of Crnojevići (0,5 MW) were constructed in 1937 and 1938. [10]. Besides these small hydropower plants, in further decades five more small hydropower plants were constructed, such as Slap Zete (1,2 MW), Glava Zete (5,4 MW), Šavnik (0,2 MW), Rijeka Mušovića (1,3 MW) and Lijeva rijeka (0,05 MW) [11], as two large hydropower plants. HPP Perućica (307 MW) was constructed in 1960 in Nikšić, while HPP Piva (363 MW) was constructed in 1976 [12]. Therefore, hydropower in Montenegro is used for production of 67 % of overall electricity produced, i.e. 73 % of overall electricity consumed in 2013 [13].

Transformation of energy sector of Montenegro started by the adoption of the Law on Energy in 2003. This transformation is characterized by adjusting energy sector of Montenegro to the EU energy policy and organization. Therefore, Montenegro in 2005 became signatory country together with neighboring countries to the Energy Community Treaty which commits to application of the EU Directives in the field of energy, environment and competitiveness. By this the period of additional amendments and harmonization of energy sector and policy with the EU Directives begins and it is still in progress. In 2010 Montenegro adopts the Law on Energy introducing new reforms and amendments of energy sector, but also provides direct support to renewably energy sources projects in accordance with Directive 2009/28/EC.

As Montenegro, as well as other neighboring countries, due to political developments in the Balkan Peninsula, missed cycle of development of energy facilities in 1990s, re-cycle of development of hydropower capacities started with adoption of the Strategy of small hydropower plants in Montenegro in 2006. In period from 2007 until today, Montenegro has conducted four public tender for allocation of concessions for construction of small hydropower plants. In addition, the Law on Energy from 2010 approved shorten procedure of allocation of concessions for small hydropower plants with installed capacity of 1 MW by procedure of energy permit. Paralell with processes of allocation of concessions, hydrological, planned, electricity and other basis that did not exist as systematized basis in time of starting the process were developed.

In 2014, Montenegro adopted NREAP, which, in accordance with the Law on Energy, is planning development of sHPP. Table 1 provides planned dynamics of increase of overall installed capacity and produced electricity by using sHPP in Montenegro which is defined by NREAP.

Table 1 Planned dynamics of development of sHPP in Montenegro by 2020 [14]

	2015		2016		2017		2018		2019		2020	
	[MW]	[GWh]	[MW]	[GWh]	[MW]	[GWh]	[MW]	[GWh]	[MW]	[GWh]	[MW]	[GWh]
< 1 MW	4,5	14	4,5	14	6,8	20,3	11,2	35,1	11,2	35,1	11,2	35,1
1–10 MW	29	88	32	96	38,5	113,7	81,6	238,9	86,3	251,9	86,3	251,9
Overall sHPP	33,5	102	36,5	110	45,3	134	92,8	274	97,5	287	97,5	287

Development of small hydropower plants in Montenegro is considered a manner of development of renewable energy sources and encouraging economic development of the north of Montenegro. In accordance with the EU policy of energy development in the direction of distribution sources that use renewable energy sources in efficient and sustainable manner for supply of local consumers, small hydropower plants can be a step in the right direction. Analysis of current development of small hydropower plants in Montenegro is presented below with the focus on issues in procedure of approving projects and proposals for methods of overcoming them.

Review of existing and valid projects of development of small hydropower plants

All above mentioned hydropower plants which were constructed in the period before 2007, present the property of EPCG Company (Power Company of Montenegro). Only two out of seven above mentioned small hydropower plants, sHPP „Slap zete“ and sHPP „Glava Zete“, are property of daughter company „Zeta energy“ d.o.o. Besides these hydropower plants, as the product of developing period from 2007 until today, six more small hydropower plants currently operate in Montenegro, five as a property of company „Hidroenergy Montenegro“ d.o.o. (sHPP „Jezerštica“, sHPP „Bistrica“, sHPP „Spaljevići 1“, sHPP „Rmuš“ and sHPP „Orah“ with overall installed capacity of 8,1 MW) and sHPP „Vrelo“ (0,6 MW) as property of company „Synergy“ d.o.o.

In the period from 2007 to 2015, 33 projects of small hydropower plants were approved. One out of 33 projects is on the canal for water supply, therefore it does not require signing of Concession Agreement. 19 out of 32 projects were approved through public tender process, while 13 projects were approved through allocation of energy permit by the ministry responsible for energy affairs. Concession Agreements were approved and signed by the Government of Montenegro for 26 out of 32 projects, while six projects for which energy permit is allocated are waiting the signing of the Concession Agreement during 2015. 21 out of 26 project for which concession is allocated are active, while five Concession Agreements were terminated.

Review of active projects is given below, according to the manner of allocation of concession, according to the municipalities and phases of implementation in which the project takes place. Review of project is developed on the basis of information discussed on the session of the Government of Montenegro in the period from 2010-2015, on the basis of permits and approvals published on websites of competent ministries and on the basis of insight in Agreements with Annexes and appendix available on the request in the Ministry responsible for energy.

Review according to the manner of concession allocation

Concession for water use of watercourse for construction of sHPP, as it will be described in details in the next chapter, can be allocated by procedure of public tender, i.e. tender or procedure of allocation of energy permits. By tender procedure, concession for construction of more sHPP on the area of one watercourse with its tributaries is allocated. Subject of concession is defined by the Concession Agreement. Current practice is that the subject of concession is defined as overall watercourse from the spring to the rivermouth with its tributaries, provided that technical documentation which defines the manner of usage of this watercourse presents an integral part of the Agreement. Energy permits can be allocated for only one sHPP, with installed capacity up to 1

MW, on local watercourse with hydropower potential up to 15GWh. In the case of energy permit, subject of concession is defined as part of watercourse, without its tributaries, set by upper and lower elevation.

In the period from 2007 until today, the state of Montenegro has conducted four tender procedures: I tender 2007/2008, II tender 2009/2010, III tender and IV tender 2013/2014. On the basis of these procedures, 19 concessions are allocated, out of which five are confiscated by termination of Concession Agreement. On the basis of currently active 14 agreements, construction of 30 sHPP is expected with overall installed capacity of 75 MW and planned annual production of 236 GWh. Installed capacity of average sHPP approved by tender procedure is 2,5 MW, while eight out of 30 planned sHPP have installed capacity lower than 1 MW.

I tender (2007/2008):

- Eight Concession Agreements are allocated on eight watercourses on 26th September 2008;
- Five out of eight Concession Agreements are still active, three Agreements are terminated;
- Construction of 15 sHPP of overall installed capacity of 34 MW and planned annual production of 100 GWh is planned;
- Two Agreements are in exploitation and construction phase, while one is still in a phase of obtaining permit due to impossibility to approach the area due to disagreement of local population.
- Agreements are implemented in five phases, where only IV phase, exploitation phase, presents the period of concession. All phases are defined by Agreement and accompanying Annexes and deadlines begin to run by signing the Agreement.
- Concessions are allocated to the entire watercourse, where technical solution defines the manner of exploitation. Technical solution is defined and accepted by the grantor in the I phase of implementation of the Agreement and presents an integral part of the Agreement.

II tender (2009/2010):

- Five Concession Agreements were allocated to the five watercourses in September/ October 2010;
- Three out of five Concession Agreements are still active, two Agreements were terminated;
- Planned construction of five sHPP of overall installed capacity 18 MW and planned annual production of 52 GWh;
- One Agreement is in the construction phase, while two are in the phase of issuing needed permits and conditions for obtaining construction permit;
- Agreements are implemented into three phase, where all three phases present the period of concession. Phases and deadlines are defined by the Agreement and Annexes, and deadlines begin to run by obtaining UTC.
- Concessions are allocated to the watercourse. Technical solution is defined by offer, accepted during tender evaluation by the grantor and presents an integral part of the Agreement.

III tender (2013/2014):

- Four Concession Agreements were allocated to the four watercourses on 23rd April 2014;

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- Construction of six sHPP of overall installed capacity 14 MW and planned annual production of 50GWh is planned;
- One Agreement is in the construction phase, while other three are in pre-phase of obtaining UTC;
- Agreements are implemented into three phases, where all three phases present a period of concession. Phases and deadlines are defined by the Agreement, while deadlines begin to run from the date of adoption of plan documentation on the basis of which UTC can be issued;
- Concessions are allocated to the watercourse and limited by technical solution on the basis of which water approval and construction permit can be obtained. Technical solution is defined by offer, accepted during tender evaluation by the grantor and presents an integral part of the Agreement.

IV tender (2013/2014):

- Launched on the basis of its own initiative in accordance with the Law on Concessions;
- Two Agreements to the two watercourses were allocated on 5th December 2014;
- Construction of four sHPP of overall installed capacity 8,6 MW and planned annual production of 34 GWh is planned is planned;
- Both Agreements are in the process of obtaining UTC;
- Agreements are implemented into three phases, where all three phases present the period of concession. Phases and deadlines are defined by the Agreement. Deadlines begin to run from the date of the adoption of plan documentation on the basis of which UTC can be issued;
- Concessions are allocated to the watercourse in accordance with technical solution on the basis of which water approval and construction permit are obtained. Technical solution is defined by offer, accepted during tender evaluation by the grantor and presents an integral part of the agreement.

Procedure of allocation of energy permits lasted in the periods from August 2010- November 2011 and from September 2014 until today. Procedure of energy permit was temporarily stopped in November 2011 due to preparation of the Strategy of energy development of Montenegro by 2030 and the Programme of development and use of renewable energy sources, i.e. NREAP, which should define dynamics of development of small hydropower plants in Montenegro. Concession to the part of watercourse which has been defined by elevations and which is used for construction of one small hydropower plant with installed capacity up to 1 MW is allocated by the procedure of energy permit. On the basis of energy permits allocated from 2014 until today, Concession Agreements are not yet signed, i.e. concessions are not allocated.

Energy permits:

- 13 energy permits for construction of sHPP on parts of 11 watercourses are issued;
- On the basis of issued energy permits for now seven Concession Agreements are allocated on parts of six watercourses;
- On the basis of energy permits, construction of 13 sHPP with overall installed capacity of 8,7 MW is planned, with planned annual production of 33 GWh;
- One Agreement is in the exploitation phase, two Agreements are in the construction phase, two Agreements are in the phase of issuing construction permit, while two Agreements are

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in the process of obtaining UTC. Finally, Concession Agreements for seven projects have not been yet signed, although energy permit was issued;

- Agreements are implemented in three phases, where all three present the period of concession. Phases and deadlines are defined by the Agreement. Deadlines begin to run by issuing UTC;
- Energy permit and concession are allocated to the part of watercourse which is clearly defined by upper and lower elevation, which is needed for construction of one small hydropower plant.

Therefore, on the basis of allocated concessions, construction of 37 small hydropower plants with overall installed capacity of 80 MW is planned with planned annual construction of 257 GWh. If the projects for which energy permits are allocated but for which concessions have not yet been allocated are calculated, then construction of 43 small hydropower plants is planned, with overall installed capacity of 83 MW, and planned annual production of 269 GWh. Brief review of the above mentioned is given in the Table 2, while detailed review is given in the Annex 1.

Table 2 Brief review of active projects according to the manner of allocation of concession

Serial Number	Procedure	Number of active Agreements	Number of terminated Agreements	Number of sHPP	P [MW]	E [GWh]
1	Tender I	5	3	15	34,32	100,07
2	Tender II	3	2	5	17,95	52,08
3	Tender III	4	0	6	13,86	49,73
4	Tender IV	2	0	4	8,59	34,30
Overall tender procedure		14	5	30	74,72	236,18
5	Energy permits	13	0	13	8,69	32,82
OVERALL APPROVED sHPP PROJECTS		27	5	43	83,41	269,00

If currently approved projects of sHPP sum up together with existing sHPP, taking into account planned reconstruction by EPCG defined by the Strategy of energy development by 2030 [9], we get that approved projects nearly reached planned objective for 2020 of 97,5 MW, i.e. reached objective from the Strategy defined for 2020. Table 3 gives a review of existing and approved small hydropower plants divided into two groups, as defined by NREAP and Table 1.

Table 3 Existing and approved projects of sHPP 2015

	EPCG sHPP [MW]	EPCG sHPP planned reconstruction (2016) [MW]	sHPP approved by tenders 2007 -2014 [MW]	sHPP approved by energy permit [MW]	Overall[MW]
< 1 MW	1,2	1,5	5,8	8,7	16,0
1–10 MW	7,9	9,9	68,9		78,8
Overall sHPP	9,1	11,4	74,7	8,7	94,8

Review according to municipalities

Review of allocated concessions, i.e. approved projects of sHPPs according to municipalities is important because it gives rough review of geographical distribution of these projects. Existing power system of Montenegro is divided into transmission power system (over 35 kV) and distribution system (35 kV and less). Transmission power system is arranged as shown in Figure 1 (a), where are shown large production facilities, two hydropower plants and one thermal power plant. Distribution system is radial type. Therefore, rural locations with watercourses at which sHPP are constructed can be found in areas with weak low voltage network. If the construction of sHPP is planned in cooperation with the development of the power system, i.e. depending of consumption at specific areas, small hydropower plant can improve quality and security of supply in rural areas.

In accordance with currently approved projects, the largest number of sHPP is planned in Kolašin (11), Berane (10), Andrijevica (8), and Plav (7). sHPP are also planned in Bijelo Polje (2), Plužine (2), Mojkovac (1), Gusinje (1) and Budva (1), as shown in Table 4 and in details in Annex 2. However, if planned installed capacity is considered, Andrijevica is in the first place with 22,3 MW, which mostly contributes Trepča river with planned sHPP with 9,6 MW. After Andrijevica, there are Berane with 19,9 MW, then Plav with 17,2 MW, Kolašin with 10,1 MW, Plužine with 5,4 MW and Bijelo Polje with 4,1 MW.

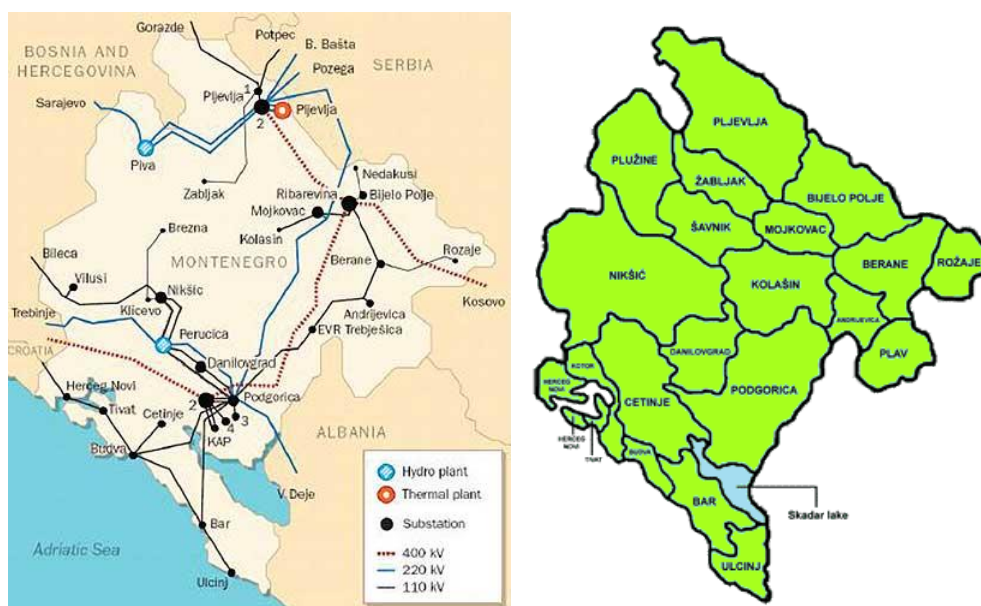


Figure 1(a) Infrastructure of the power system [15], (b) Division of Montenegro according to municipalities [16].

Table 4 Brief review of sHPP according to municipalities

Serial Number	Municipality	Number of watercourses	Number of sHPP	P [MW]	E [GWh]
1	Kolašin	9	11	10,1	33,0
2	Mojkovac	1	1	0,6	2,5
3	Andrijevica	5	8	22,3	74,4
4	Berane	3	10	19,9	62,2
5	Bijelo Polje	2	2	4,1	13,7
6	Plav	4	7	17,2	54,2
7	Gusinje	1	1	3,0	5,7

8	Plužine	1	2	5,4	20,3
9	Budva	1	1	0,95	3,2

Review according to phases of implementation of project

Projects of small hydropower plants in Montenegro are implemented according to phases defined by the Concession Agreement. However, besides these phases, there are pre-phases of the project approval that are not included in the period defined by the Agreement. In the next chapter, detailed analysis of procedure of implementation of sHPP is presented.

Following phases exist in all Concession Agreements:

- Phase of obtaining construction permit i.e. developing technical documentation. This phase begins by issuing UTC, and finishes by obtaining construction permit;
- Construction phase. This phase begins by obtaining construction permit, and finishes by obtaining utilization permit for constructed facility and
- Exploitation phase. This phase begins by obtaining utilization permit for constructed facility and finishes by expiration of the concession period, which is in most cases 30 years.

As projects of sHPP are approved by using two procedures- tender procedure and obtaining energy permit, project of sHPP is considered approved whether by signing the Concession Agreement or by obtaining energy permit. Obtaining energy permit should be automatically followed by approval of the Government of Montenegro and by signing the Concession Agreement, but as some of approved projects did not get the Concession Agreements, this phase occurs in our review as the phase of approval of concession.

In addition, if it is assumed that all necessary planning assumptions for implementation of project of sHPP exist, UTC should be obtained soon after the signing of the Concession Agreement and phase I of implementation should start. However, as spatial-planning documentation is developed parallel with implementation of projects of sHPP, in accordance with the Law on Urban Planning and Construction, and considering that the deadline of this period is not defined by the Concession Agreement, this phase appears as significant in some approved projects. Here it is called phase from the Agreement to the UTC.

Although Concession Agreements are defined according to watercourses on the basis of tender procedure, when it comes to the implementation of the project, and especially in the phase of construction and exploitation, some sHPP are constructed before others, and therefore Agreements are modified by Annexes in order to comply phases defined for watercourse by sHPP. Therefore, data according to phases for all planned sHPP are summarized in the following:

Phase of approving concession

- Seven sHPP according to energy permits are found in this phase;
- Seven sHPPs overall installed capacity of 3 MW and planned annual production of 12 GWh;

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- The longest duration of this phase is five months, although that phase should be relatively short just as it is necessary for administrative procedures of approval of concession (about two weeks).

Phase from Agreement to UTC

- 11 sHPP are in this phase;
- 11 sHPP overall installed capacity of 20 MW and planned annual production of 79 GWh;
- For current projects, the longest duration of this phase is 13 months. This mostly presents projects from III and IV tender that are in accordance with the Law on Spatial Planning and Construction and for which currently spatial provisions for issuing of UTC do not exist, but it is necessary to develop local study of locations for specific projects, in accordance with spatial-urban plans.

Phase of issuing construction permit

- Eight sHPP are in this phase;
- Eight sHPP overall installed capacity of 15 MW and planned annual production of 41 GWh;
- The longest duration of this phase for current projects is four years and four months as shown in the Annex 3. This phase is defined to a maximum of one year by the Agreements.

Construction phase

- 12 sHPP are currently in the construction phase;
- 12 sHPP of overall installed capacity 32 MW and planned annual production of 98 GWh;
- The longest duration of this phase is three years and six months as shown in the Annex 3. This phase is defined by the Agreements on the maximum of two years.

Exploitation phase

- Six sHPP are currently in the exploitation phase;
- Six sHPP of overall installed capacity mHE 9 MW and planned annual production of 28 GWh;
- sHPP that is longest in this period is one year and seven months, while others are in the exploitation phase only a month.

Table 5 gives brief review of the above mentioned allocation of approved sHPP, while detailed review of approved sHPP according to phases is given in the Annex 3 .

Table 5 Brief review of approved sHPP according to phases of implementation in which they are currently found

Serial Number	Phase	Number of sHPP	P [MW]	E [GWh]
1	Approving of concessions	6	3	12
2	From Agreement to UTC	11	20	79
3	Obtaining construction permit	8	15	41
4	Construction	12	32	98

5	Exploitation	6	9	28
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Review of terminated Agreements

Overall five agreements were terminated, out of which two were in the initial phase of implementation, i.e. did not enter the procedure for obtaining UTC, one was in the phase of obtaining construction permit, and two were in the construction phase. Review of terminated Concession Agreements was given in the Annex 4, together with the manner and the reason of termination.

In accordance with relevant Concession Agreements, the omission that has occurred during implementation in all five cases is defined in the Agreement as the obligation of concessionaire, i.e. his risk. However, bank guarantee was charged only for termination of one Agreement, while two Agreements are terminated by mutual agreement.

III Procedure of realization of small hydropower plants

Procedure of realization of sHPP presents procedure from the idea for construction of sHPP to the operation of that sHPP, i.e. exploitation of natural resource. Procedure of implementation of sHPP is divided into four phases:

- planning phase
- phase of approving the project
- construction phase
- exploitation phase.

These realization phases are recognized in all procedures for sHPP, both in countries of the European Union and in Montenegro. Depending on legal framework, some of above mentioned phases can be more complicated and may request substeps, like the case is with the phase of approving the project. On the other hand, planning phase presents the phase which is closely related with strategic planning of development of energy, water management and other activities, as it will be explained below.

Although all steps in the procedure of realization of sHPP will be briefly explained, this study focuses on planning phase and the phase of approving projects. These two phases are considered in details and comparison of general procedure is provided in chosen EU countries, legally defined procedures and implementation procedures in Montenegro.

Review of implementation procedure of sHPP in Montenegro is given in the Figure 2 from idea to the end of exploitation phase, defined on the basis of valid legal framework. Blue indicates steps in the procedure that indicate end of one and beginning of other phase, in accordance with above mentioned phases.

Planning phase presents strategic planning in the fields of water management, energy, environment and spatial planning. This phase presents basis for development of sHPP. Result of this phase presents water cadastre which is used as basis for launching the procedure of approving the project.

Phase of approving project starts with initiative of investor or owner of resource, i.e. state or local government. Phase of approving comprises approving of project from the aspect of energy, ecology, water and construction aspect. In Montenegro, the process of approving project comprises of two subphases: (i) approving projects from the aspect of energy and water use, i.e. allocation of concession and (ii) approving of project for construction i.e. allocation of construction permit. This phase can last minimum six months in the case of energy permit, i.e. 12 months in the case of tender procedure. Thereby, project is considered to be fully approved by obtaining construction permit and construction can start.

Construction phase starts by obtaining construction permits and finishes by operation of sHPP, i.e. obtaining utilization permit. Depending on facility of sHPP, this phase can last minimum one year, but it is usually defined on two years in the Agreements.

Exploitation phase of facility starts by obtaining utilization permit and ends by submission of facility to the ownership of the state of Montenegro, i.e. the grantor. The Law on concession defines the

period of concession to a maximum of 30 years, with possibility of eventual extension for more 15 years. Period of concession is defined by the Concession Agreement, where it is defined which realization phases are included in the period of concession. Therefore, depending on definition of the period of concession, in the Concession Agreement this phase may last up to 30 years, i.e can present overall period of concession.

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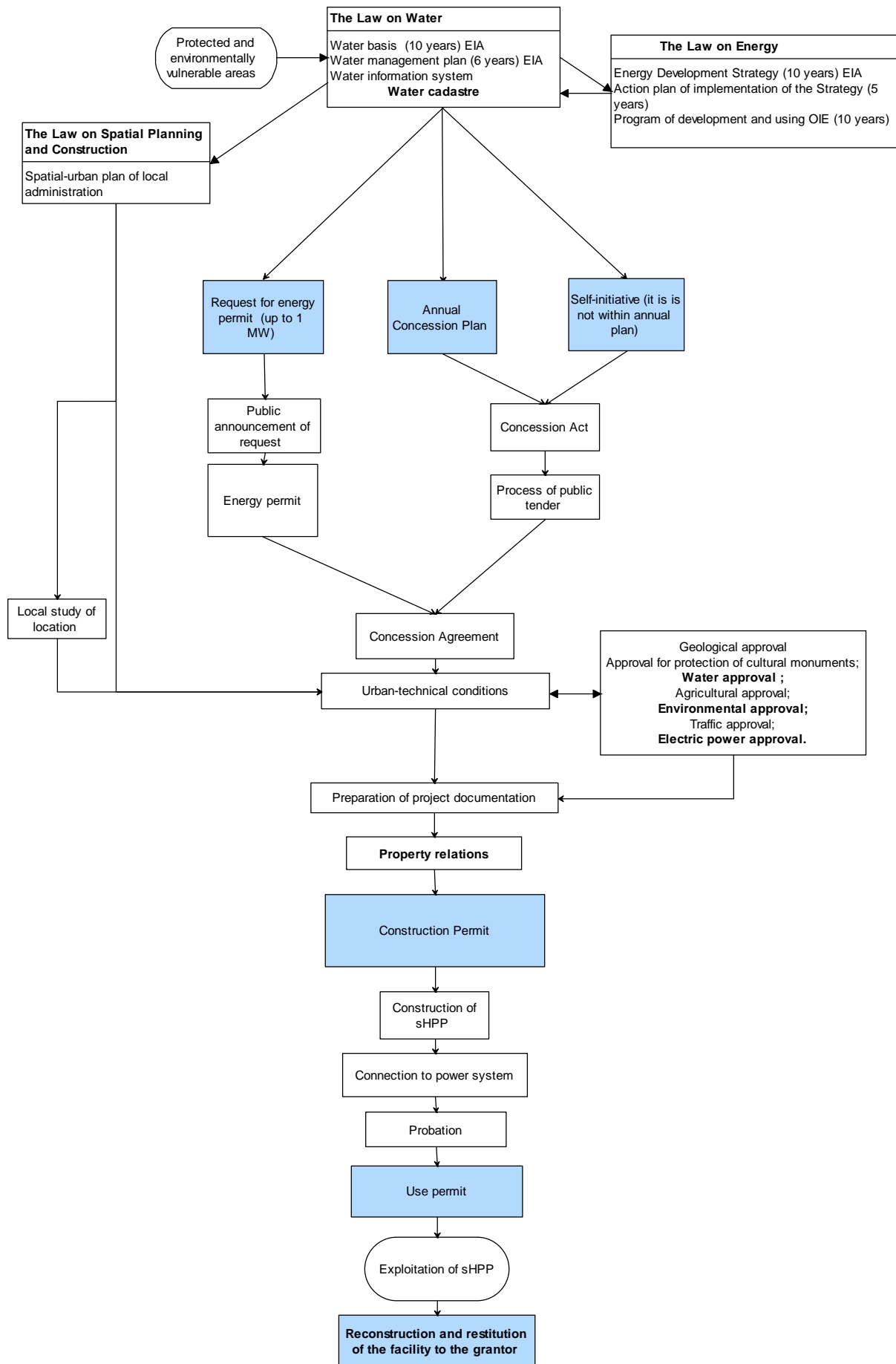


Figure 2 Schematic review of realization procedure of sHPP in Montenegro based on legal framework

Most of concluded Concession Agreements for sHPP in Montenegro define period of concession as the sum of part of approval phase of obtaining UTC, construction and exploitation phase. In this way, duration of exploitation phase is usually defined to 27 years, but it is also dependent on the duration of other phases.

Below, we deal with planning phase and phase of approving projects.

With the aim of defining main deficiencies and issues in the procedure of realization of sHPP, especially in the planning and approving phases, these phases of procedure are analyzed in countries of the EU, as well as comparing legally defined procedure and implemented procedure in Montenegro. As previously mentioned in the Chapter 1, member countries of the EU are planning to increase the capacity of sHPP for 6 GW by 2020. During preparation of this study, procedures in six EU countries are analyzed as follows: Austria, France, Italy, Sweden, Slovenia and Portugal. Procedures in these countries are analyzed due to every country has important hydropower potential, plans construction of additional sHPP, as well as has similar legal basis such as Montenegro.

Phases of planning and approving in countries of the European Union

Planning phase presents strategic step that is not directly connected to the concrete sHPP project, while it is necessary for long-term planning of using resources and economic development. In addition to Directive on encouraging renewable energy sources 2009/28/EC which obliges on planning of dynamics of development of renewable energy sources through NREAP, other Directives oblige to strategic planning as well. Among them is Water Framework Directive which requires the adoption of River basins management plans which would give integrated review of potential and possibility of using the water in that basin. Most issues that are noticed in the realization procedure of sHPP in the EU is caused by insufficiently good coordination in the planning of sector development, i.e. incoordination of sector during implementation of directives. This problem with implementation of Water Framework Directive and Directive on encouraging renewable energy sources has caused complications and inefficiency in procedure of approving sHPP in Slovenia and in other EU countries as well [17].

In order to overcome these issues, overall strategic planning is proposed, i.e. planning of energy sector development, especially sHPP with integrated environmental conditions and criteria, i.e. integrated with water management plans [8]. In addition, before the beginning of approving phase, i.e. submission of request for specific project, detailed verification of strategic plan of using resources is done in all analyzed countries, in order to check the integration of potential project into designated development project [4]. In that sense, Austria adopted in 2012 watercourse catalogues that provides 16 energy, environmental and economic criteria on the basis of which validity of the project is evaluated. This catalogue is not legally binding for the institutions that use it when assessing the project, but it gives investor a possibility to do first probability verification of passing the project [4].

In addition, France, Sweden and Slovenia practice detailed verification of sHPP project in relation to strategic plans in the field of energy, water, environmental protection in order to include only

projects that have strategic support in the approving procedure. This is done in France and Sweden through preliminary meeting/meetings at which investor presents proposed project with alternatives to relevant institutions before very application. In Slovenia, this verification is performed by the Water Directorate which defines whether concession proposal is acceptable for further procedure or not [4].

Phase of approving project begins by submitting request for issuing permit. In all analyzed countries, during consideration of submitted request and approving project, several different institutions are involved, and in that way project is considered from different aspects of development by representatives of institutions dealing with that field. Process of approving projects have one or two subphases depending on national legislation. In Austria, Italy and Sweden, on permit is issued for approving project from the aspect of using resource and approving concept of the project, as well as for construction of the very project. In that case, before initial application of the project, investor should prepare overall documentation and project in details needed for obtaining construction permit, connection, as well as using of water and environmental impact. On the other side, in France, Portugal and Slovenia approving phase presents longer procedure where first water using permit is obtained in which ecological aspects, i.e. concession are included, then approval for connection by relevant institution and finally construction permit.

Article 13 of the Directive on encouraging renewable energy sources 2009/28/EC obliges member countries of the EU to consider possibilities for defining leaner and simplified procedures for smaller projects that represent distribution producers, and that use renewable energy sources. In that sense, Austria and France recognize sHPP of installed capacity below 500 kW as micro facilities with simpler procedures [17,18].

Can not be said that these procedures for implementation of sHPP in these countries present ideal examples, but these procedures are analyzed from the aspect of collecting examples of good practice with the aim of improving a part of procedure which would not be optimal in Montenegro. Analysis of these parts of procedure with proposals based on practices in these countries is presented in the next chapter.

Phases of planning and approval in Montenegro

Planning phase

Planning phase in Montenegro presents strategic planning in the field of water management, energy, environment and spatial planning. As sHPP present only one of manners of using water resource, the Law on Water provides basis for planning of water usage. In accordance with the Law on Water, using of waters is planned on strategic level through water basis, while defining quality and quantity of water as well as their use in catchment areas is defined by water management plan. These documents require involvement and overlap with fields that use water resources, but also require obligatory strategic assessment of environmental impact which enables definition of concrete measures and conditions for using of resources.

On the other hand, Law on Energy defines obligation of adoption of the Strategy of energy development of Montenegro which defines current state of energy sector, needs and development direction of energy sector for the period of ten years. With the aim of achieving plans defined by the

Strategy, Action plan for implementation of Strategy is adopted every five years. This plan has an aim to define manner and dynamics for implementation of concrete activities, relevant institution as well as deadlines in which they must be implemented. Dynamics of development of renewable energy sources, as well as planned use of specific technologies are closely defined by the Program of development and use of renewable energy sources which is developed for a period of ten years, and is in accordance with the NREAP form.

Finally, the Law on Water defines possibility of adoption of water cadastres which become integral part of information system of water on national level. For the need of planning sHPP, cadastre of water facilities and system and cadastre of water use are the most relevant, defining amount and manner of water use, quality of water and data about systems for water use according to their purpose. Overlapping of energy needs for additional energy amounts from sHPP with possible watercourses and water amounts that can be used in that purpose, leads to cadastre that is used for planning development of sHPP and should be entered in planning documentation.

Planning phase is defined by valid legal framework, as shown in Figure 3. The Law on Water is adopted in 2007, and currently only Water management basis of the Republic of Montenegro from 2001 is used, from all strategic documents from water management planning. This basis, although quality developed, requests updating and amendment, as well as compliance with current directions of development of sector dealing with water management and environment, as well as other sectors that use water. Therefore, the lack of valid water basis, water management plan as well as water cadastre of harmonization user of water resources is impossible and leaves great potential for complicated procedures during implementation of the project. Figure 4 gives review of current implementation planning phase in Montenegro.

Strategic documents from the energy field define required amount and dynamics of increase of energy production and consumption. In this regard, from the aspect of sHPP, Program of development and use of renewable energy sources, NREAP, defines dynamics of increase of installed capacity and production by using sHPP on annual level as shown in previous chapter.

Therefore, there is no valid legal document which connects this energy dynamics of development of sHPP with concrete sites, watercourses, i.e. water resource. That leads to a problem in collection, i.e. preparation of data on environmental state, power network, spatial planning, i.e. disables preparation of basis in planning phase.

Step in this direction presents Cadastre of small watercourse prepared for local watercourses in 13 north municipalities in Montenegro. This cadastre was prepared in 2011-2012 in cooperation with the Institute for Hydrometeorology and Seismology of Montenegro with the aim to define potential locations on which sHPP can be developed from energy, hydrological and economic aspect through procedure of energy permit [19,20,21,22]. However, this cadastre is not publicly available and approach is not transparent.

Main differences between regulation and implementation phase of planning, i.e. Figure 3 and 4 are following:

- Lack of water management basis, including valid water management basis, Water Information system and water cadastres in implementation procedure;

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- Action plan for implementation of the Strategy of development of energy does not exist, while program of development and usage of renewable energy sources was adopted for the period of six years, and not for the period of 10, as defined in the Law on Energy;
- Inconsistency and connection in the field of energy, water management, spatial planning and environmental protection in implementation phase of planning, Figure 4.

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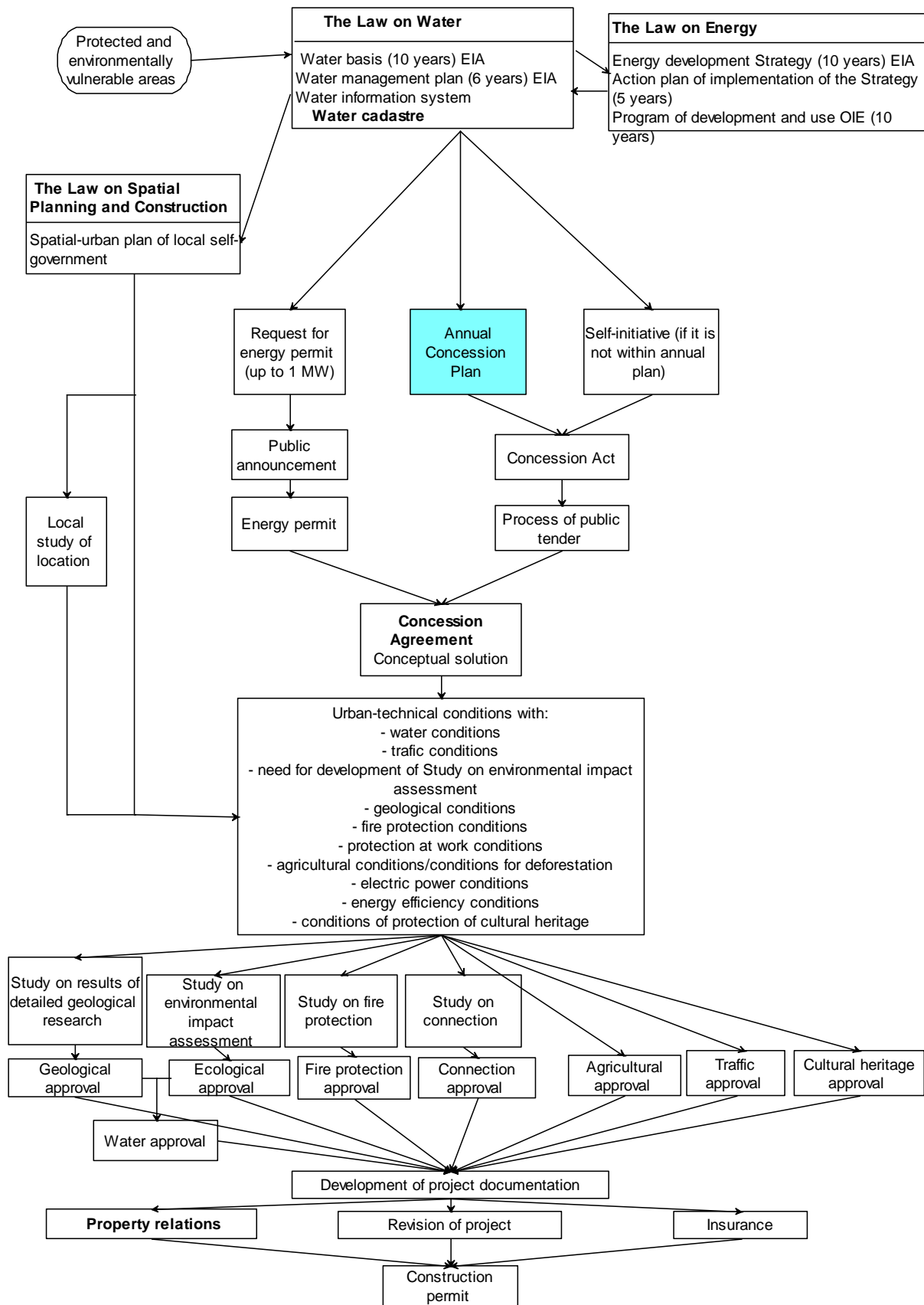


Figure 3 Phase of planning and approving in accordance with valid legal framework in Montenegro

Steps towards sustainable development of small hydropower plants in Montenegro

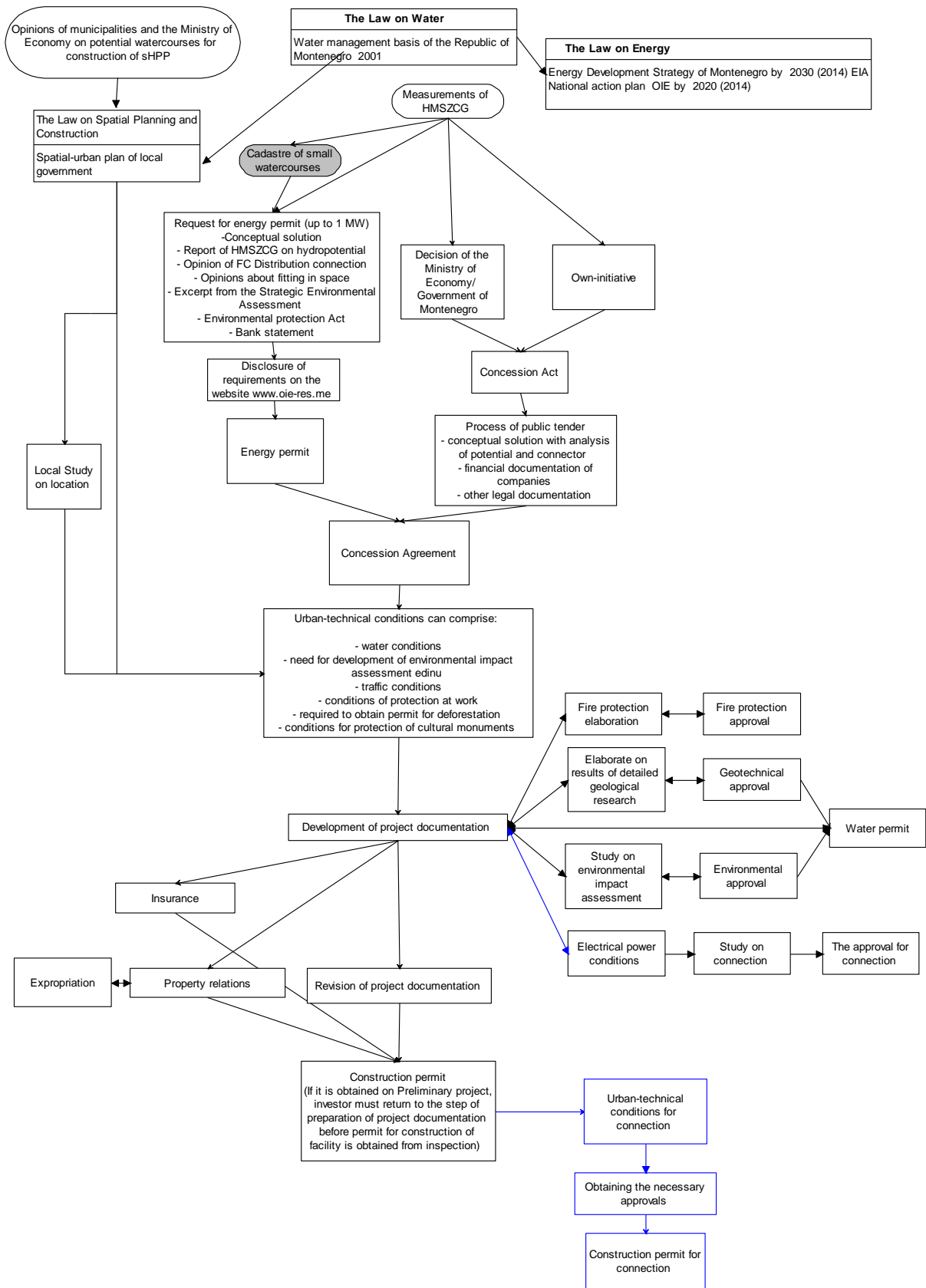


Figure 4 Phase of planning and approving in accordance with implementation procedure in Montenegro

Phase of approving

Phase of approving project in Montenegro comprises of two sub-phases:

1. Approval of project from the aspect of using resource in specific way, i.e. allocation of concession and
2. Approval of construction of project, i.e. obtaining construction permit.

Process of allocation of concession in Montenegro is regulated by the Law on Concession. With the aim of allocation of concessions, the Law on Concession defines obligation of adoption of annual concession plan (Figure 3). Locations where allocation of concession is planned during the following year are defined by this plan. If specific watercourse, or part of watercourse is not defined by annual concession plan, investor can initiate procedure of allocation of concession for that watercourse, which administration body do not have to accept if it is shown that specific conditions do not exist. Regardless of whether the process is initiated on the basis of its own initiative or annual concession plan, the next step is preparation of Concession Act which defines conditions, criteria and subject of public tender, on the basis of which procedure of public tender will be launched. Procedure of public tender finishes by defining first-ranked bidder, to whom concession on defined watercourse is allocated.

The only exception to public tender procedure defined by the Law on Concession for sHPP can be projects of sHPP of installed capacity up to 1 MW on watercourses of local importance, defined in accordance with the Law on Water. This procedure of energy permit is defined by the Law on Energy, in accordance with the Directive 2009/28/EC which requires defining simpler procedures for smaller projects. Procedure of energy permit is concluded by issuing energy permit on the period of two years. Given that in this case government's resource is used, i.e. water, concession is allocated. In the case of energy permit, concession is allocated to the part of watercourse which is needed for construction of one sHPP, i.e. part of watercourse from upper elevation where water intake is predicted to the lower elevation where machine facility and returning of water to natural flow are predicted.

Subject of concession is defined by the Concession Agreement. In currently implemented procedure, in the case of public tender, subject of concession is defined as watercourse with possibility of using in accordance with technical documentation that can be changed until obtaining construction permit. In the cases of obtaining energy permit, subject of concession is defined in the Concession Agreement on the basis of requirements for energy permit, i.e. idea solution submitted with the request.

Process of approving the construction of project begins after concession allocation. Process of approving the construction of facility is defined by the Law on Spatial Planning and Construction. Concession Agreement defines deadlines within which construction permits should be obtained. In accordance with signed Concession Agreements, except Agreements from I tender, this period of concession allocation starts to count from obtaining UTC, that should be issued immediately after concession allocation, if all conditions for the existence of appropriate planned documents are met.

The Law on Spatial Planning and Construction defines spatial planning, i.e. manner of issuing UTC. In that sense, if basis or separate publication with UTC exists in spatial-urban plan, they can be issued

on the basis of SUP. This plan is adopted on the level of municipalities. If SUP defines that it is necessary to develop LSL, LSL should be developed as soon as basic data on possible/planned project and location are provided. If the planning phase is implemented as defined in the Figure 3, planning conditions are met and after signing Concession Agreement, UTC can be issued.

In order to obtain construction permit and enable the construction, it is necessary to prepare detailed technical documentation, i.e. main project. In accordance with other laws that regulate fields of environmental protection, energy, occupational safety, water, geological research, protection of monuments, traffic, etc. it is necessary to obtain appropriate approvals if they are not included in/with obtained UTC. The Law on Spatial Planning and Construction defines joint procedure, where all needed approvals and conditions for obtaining construction permit can be issued by institutions that provide UTC and construction permit.

However, in defined legal framework, this is not completely integrated and harmonized, so that specific approvals, such as environmental and power, need to be obtained by institutions responsible for this field.

Implemented procedure for obtaining approval for project, i.e. approval for concession and approval for construction is defined on Figure 4.

There are three main differences between Figures 3 and 4 related to procedure of approval:

- Initiative by the State of Montenegro for launching procedure of public tender for concession allocation for sHPP is not done on the basis of annual concession plan, but only on the basis of the list of watercourses for which hydrological measures that are developed by HMSZCG exist;
- UTC are not obtained immediately after signing the Concession Agreement, because in most cases there are no planning conditions for issuing UTC, but it should wait for development of SUP or LSL. This is a reactionary problem due to lack of water cadastre in the planning process as well;
- It is not clearly defined which approvals are needed for obtaining construction permit, so that in some cases construction permit for sHPP is obtained independently from the connection of sHPP to the power system, although the basic purpose of sHPP is production of electricity that will be submitted to the power system.

Approving phase finishes with obtaining construction permit. On the basis of this permit, construction of sHPP should start. Exception presents the case when construction permit is issued on the basis of conceptual rather than main project. In that case, construction permit enables performance of preparatory work and parallel preparation of the rest of documentation. The responsibility of verifying the completeness and quality of documentation is left to the building inspection, which provides approval for the beginning of construction of sHPP.

IV Deficiencies and manners of improving procedures

Legal framework and procedures need to be constantly improved depending on development policy, new technical and scientific discoveries and achievements, as well as implementation of existing and recognition of practical solutions. Regarding sHPP, technologies and manners of functioning are enhanced especially with significant increase in knowledge regarding environmental impact and manner of reducing these impacts. EU recognizes the well-being of this manner of improvement of legal framework, so it is noticeable that Directives are regularly interchanged by new, or complemented and amended.

Montenegro, as country which decided to recognize its development of renewable energy sources and set sustainable development as one of its objectives of development should encourage improvement of procedures and changes of legal framework with the aim of achieving these aims. Besides, Montenegro is in pre-accession negotiations with the EU and therefore should aim to harmonization of its legal framework and implementation with directives and examples of good practice in the countries of the EU.

On the basis of analysis of legally defined and implemented procedures, especially planning and approving phases of sHPP in Montenegro, ten most important deficiencies/issues are defined. These issues are listed below by priority related to their importance for improving existing procedures towards sustainable development of sHPP:

- 1. Lack of water management basis;**
- 2. Lack of cadastre of watercourses with environmental and energy characteristics;**
- 3. Lack of annual or years-long planning of dynamics of using watercourse in energy purposes;**
- 4. Incompatibility of legal regulations or their implementation;**
- 5. Insufficiently clear defining of responsibilities of concessionaires and grantor;**
- 6. Poor capacity of institutions responsible for water and energy management;**
- 7. Monitoring, review and quality defining of strategic objectives in the field of energy;**
- 8. Preventing the allocation of responsibility/control of procedure to one institution;**
- 9. Greater public involvement during planning/approving projects;**
- 10. Compliance of strategic plans and harmonization of policies of energy, water management, environment, spatial planning and construction sector.**

The analysis of every of the above mentioned issues with solution proposals is given below. Solutions are defined as change in manner of implementation of existing regulation, manner of allocation of responsibilities or termination/addition of new procedures.

1. Lack of water management basis

From the aspect of sustainable use of water, whether for construction of sHPP or not, data on amount and quality of water is needed, as well as on their use. This is very important if using of water is planned with the aim of economic development. The Law on Water, adopted in 2007, defined the obligation of adopting:

- Water management basis, on the period up to ten years;
- Water management plans, on the period up to six years,
- Water cadastre and
- Information system.

Water management basis presents overall document which gives a review of water management of one country, defining importance, quality and conditions and manner of using waters for the purpose of specific strategic fields. Currently, Water management basis of the Republic of Montenegro from 2001 is used, although, not only that 14 year-period passed, but important changes in plans occurred and manner of using waters in specific parts of Montenegro. Besides, impact of climate change on water management of Montenegro needs to be analyzed and to plan development accordingly.

In communication with Water Directorate, we got information that the institution tries to map water of Montenegro through implementation of project in cooperation with the Real Estate Directorate and the Forest Directorate. We are familiar with GIS map of watercourse of Montenegro [15], but at which watercourses are not categorized, mapped or connected with data on amount and quality of water in watercourses. Conclusion is that water management sector in current form in state administration do not have capacity to implement this important legal obligation.

Given that water, due to its amount and quality, presents an important natural resource of Montenegro, mapping, monitoring and management of this resource should be of strategic importance for citizens of Montenegro, and for the Government of Montenegro as their representative. In this regard, it is proposed to initiate forming of expert team on national level as soon as possible with the aim of defining range and finding financial resources for preparation of water management basis as well as plan of management of main basins and basis for development of information system. However, in the period from defining clear financial resources and adoption of water management plan, it is necessary to function on the basis of some strategic document from the field of water management. Update of water management basis of the Republic of Montenegro from 2001 is proposed as soon as possible, as short-term solution until the adoption of above mentioned basis.

Hydropower potential and its use, as well as sustainable development are in all national strategic documents as priorities of economic development of Montenegro. Water management basis and management plans present basis for such development.

Conclusion: Valid water management basis, water management plans, information system and water cadastres do not exist.

Solution proposal: Prepare and adopt water management basis and other water management basis as soon as possible.

2. Lack of watercourse cadastre with environmental and energy characteristics

Strategic documents and plans from the field of energy indicate important hydropower potential of Montenegro. From the aspect of using hydropotential for development of sHPP, from 2005, several projects with HMSZCG are implemented in order to prepare hydrological basis. These projects included also the project in cooperation with the Government of the Kingdom of Norway in 2005 on the basis of which measures and analysis of hydrological potential on 15 watercourses with the aim of construction of sHPP were done. This activity continued in 2009, through the project with UNDP. These measures and analysis are used as basis, Figure 4, for determination of watercourse for which process of allocation of concession with the aim of construction of sHPP can be launched.

Launching the procedure of energy permit, project of developing Cadastre for small watercourses with the aim of construction of sHPP up to 1 MW is launched for area of 13 northern and central municipalities of Montenegro where HMSZCG participated as well [19,20,22]. Cadastre of small watercourses has hydrological measures of potential and proposes possible location for sHPP of installed capacity up to 1 MW from energy and economic aspect. This cadastre comprises 80 watercourses on the territory of 13 municipalities, and presents especially smaller, i.e. local watercourses for which it can apply by energy permit procedure. This cadastre is not public and is not transparent criteria for possibility of approach to this cadastre. Cadastre is funded by EBRD, and ordered and prepared with closely cooperation with state institutions. Given that it provides data on watercourses, which present state, i.e. public resource, Cadastre should be public and transparent.

Besides, HMSZCG has minimum 40 hydrological units, that are distributed along watercourses on overall territory of Montenegro [22]. Measures on some watercourses in Montenegro can be read directly on website of HMSZCG [23,24]. However, these measures present measures of hydrological potential regardless the use.

Through implementation of projects of sHPP, it is shown that most concessionaires in later stages of project development requested the change of technical solutions, mostly due to new analysis of hydrology of watercourses obtained by measures on the location. Professional public also expresses disagreement with quality of hydrological data that are used for planning of sHPP and non-overlapping of energy plans for sHPP with maps of ecologically vulnerable areas and deficiency of ecological criteria for the use of watercourses [25].

Therefore, conclusion is that it is necessary to use all done and improve existing GIS cadastre of small watercourses so that it possess quality hydrological data, but also to include ecological data and conditions for realization of sHPP on the territory of 13 municipalities. As this presents larger part of the territory of Montenegro, project can be implemented in phases, given that the first phase of implementation analyzes watercourse for which state body is responsible for allocation of concession in the field of sHPP and defines as priority for period of two years, and continue with the rest of watercourse and areas. Final result of this activity would be classification of rivers and river segments on zones where construction of sHPP is unacceptable, less acceptable and acceptable,

which would ensure protection of water resources and environment of Montenegro as well as practical use of conditions of Framework Directive on waters in the sector of hydropower.

Conclusion: Cadastre which defines energy and environmental characteristics of water and criteria for use those characteristics for the purpose of construction of sHPP does not exist.

Solution proposal: Expand existing Cadastre of small watercourses with hydrological and state data and need of environmental protection, including ecological and hydromorphological status of water body, in order to obtain cadastre of watercourse for construction of sHPP with energy and ecological criteria.

3. Lack of annual or years-long planning of dynamics of use of watercourses in energy purposes

The Law on Energy defines the obligation of adoption of previously defined strategic and planned documents, Figure 3. These documents define dynamics of development of sHPP in the form of overall annual increase of installed capacity and produced electricity from these sources. On the other hand, if water management basis and cadastre of watercourse exist with possibility of construction of sHPP, none of these documents does not have legally defined obligation to define dynamics of allocation of concessions and watercourses to which concessions will be allocated. The Law on concessions define obligation of adopting Annual Concession Plan, which is not implemented when it comes to sHPP. This annual plan should be adopted at the end of current year for the following year.

On the basis of discussion with institutions involved in the process of obtaining approval for realization of sHPP (Annex 5), it was concluded that it is necessary to define on national level dynamics of allocation of concessions for sHPP and watercourses to which these concessions will be allocated in the period of at least three years.

From the aspect of environmental protection, it is necessary to know in advance watercourses in order to examine and define the existing, „zero“ state of environment. On the basis of such data, concrete measures that reduce negative impacts on environment and define quality ecologically accepted flow should be defined.

From the aspect of electric power, data on dynamics and geographical distribution of planned watercourses should be provided, in order to define maximum additional power on locations by using existing infrastructure and harmonize eventual additional development of network with plans of power system for other needs. In the period from 2011-2012, Study on connection and operation of distribution energy sources in the power system of Montenegro was prepared. This Study was developed in cooperation with the Ministry responsible for energy sector activities, and therefore analysis of not only planned sHPP on watercourses to which concessions are allocated, but also for watercourses to which allocation of concessions will be allocated in further period is developed. Study resulted in technical recommendations for connection of sHPP, but it is necessary to continue with defining watercourses to which allocation of concessions is planned for short-term period of two or three years.

From the aspect of improving dynamics of procedure, if potential watercourses are defined in advance, these watercourses could be included in spatial plans and prepare LSL, if necessary. In this way, there would be no further extensions of implementation procedure of projects when decision on allocation of concrete concession is made.

On the example of Austria, which possess watercourse catalogue, as earlier explained, permit for project of sHPP defines not only the amount of water that can be used, but also general technical design and approved capacity of sHPP. In projects of sHPP allocated on the basis of II, III and IV tender, and on the basis of energy permits, concessions are allocated on the basis of technical solutions which define manner of exploitation of resource. However, implementation shows that, through Concession Agreements, amendment of technical solution is approved in the later phases of project as well, until the construction permit is obtained. During the approval of amended technical solutions, relevant institutions for obtaining consent in the process of approving the project are not informed, therefore procedure is complicated and there is lack of uncertainties and failure to monitor the continuity of projects by all institutions. In this way, it is hard to define not only environmental impact, but also infrastructure needed for regular operation of sHPP due to constant changes. Greater transparency in all steps of approval phase of the sHPP projects is necessary.

Procedure of energy permit currently approves application of any watercourse on the territory of Montenegro by investor. Request for energy permit in accordance with the Law on Energy is public. However, this request is currently published on the remote side of website for renewable energy sources [15], in a very non-transparent way. In this way, institutions can not prepare with the basis for analysis of such location, because they do not get familiar with that location until they obtain request for opinion, i.e. consent.

From the above mentioned reasons, and with particular urgency, given that installed capacity of currently approved projects of sHPP is beyond capacity defined by NREAP for 2020, it is considered necessary condition for further development of sHPP to define need for development plan of sHPP by the legal regulation. Development of the Law on Energy is currently ongoing, therefore this Law can define obligation of adoption of such plan. This plan is urgently necessary in order to start systematization of development of sHPP as soon as possible, and therefore is proposed to prepare plan before the adoption of the Law on Energy. That development plan of sHPP must be prepared in cooperation with institutions dealing with water management, environment and power system. In order to include public in the planning phase, it is necessary to organize public discussion, including northern municipalities which territories and watercourses are included in plan.

Ministry of Economy is currently in the process of development of concession act for V tender for sHPP. Public, together with non-governmental organizations should urge for termination of this procedure, not only due to failure to adopt Annual Concession Plan, which is basis for starting concession allocation procedure in accordance with the Law on Concessions, lack of Action Plan of Strategy, as well as achieving necessary amounts of sHPP planned by the Strategy by 2020 in approved projects, but also for necessary systematization of plans, dynamics and analysis of need and manner of development of sHPP before approving additional projects.

Conclusion: Lack of documents which define short-term dynamics of concession allocation for sHPP and locations predicted for potential allocation.

Solution proposal: Define obligation of preparation of development plan of sHPP for period of three years by the Law on Energy. This plan would define which watercourses are planned to be used, in which framework capacities for meeting the objective of dynamics of increase of capacity of sHPP from the Strategy and NREAP.

4. Inconsistency of legal regulations or their implementation

Issue of inconsistency of legal regulation, as well as inconsistency of implementation of these legal regulations creates the most issues in the procedure of implementation of sHPP in the phase of approving project, i.e. part of phase from UTC to obtaining construction permit.

Namely, the Law on Spatial Planning and Construction defines procedure of obtaining UTC and construction permit as well. Procedure is based on the principle „one-stop-shop“, where investor, i.e. concessionaire communicate only with one institution responsible for coordination and obtaining needed consents and permits from other institutions of the system. This concept is implemented in several countries of the EU, among which is Italy.

However, for obtaining complemented and quality technical documentation, as well as for construction of facilities which purpose is electricity production, as it is with sHPP, it is necessary to obtain additional consents and conditions in accordance with other sectoral laws, Figure 3. These laws define its procedures of submitting requests, obtaining opinions or conditions, development of study and obtaining consents that are not in accordance procedural nor timely with deadlines defined by the Law on Spatial Planning and Construction.

This kind of misunderstanding in legal regulations and defined procedures leads to example of obtaining construction permits for connection of sHPP, separately of construction permits for construction of only sHPP. In the case of sHPP which is planned to be used as island, this does not represent an issue. However, in cases where the only purpose of facility of sHPP is to transfer produced electricity to power system, sHPP and its connector to power network must be observed unique. Therefore, it should not be allowed to such facilities of sHPP obtain construction permit without approval of relevant institution that manages power system.

With the aim of solving this issue, during defining of amendments to the Law on Spatial Planning and Construction as key document for the procedure of obtaining construction permit, participation of representatives of institutions dealing with energy and environment is proposed as long-term solution. **Amendments to the Law is currently in progress and urges relevant Ministry to organize round table at which institutions responsible for issuing consents necessary for construction of energy facility will participate as well as non-governmental organizations.** This would organize procedure that takes into account conditions, procedures and deadlines defined by other laws for energy facilities, and also allowed realization of the concept „one-stop-shop“.

In short-term time frame, it is proposed that cooperation with institutions which consents and conditions are necessary for quality and sustainable construction of energy facility should define list

of consents, and which would request during obtaining construction permit. In this way, connection of different procedures defined by different laws would be enabled.

Conclusion: Currently it is unclear which consents and steps are necessary for obtaining permit for construction of energy facilities.

Solution proposal: Define and implement the list of consents necessary to approve in quality and sustainable manner construction of energy facilities.

5. Insufficiently clear defining of responsibilities of concessionaires and grantor

Projects of small hydropower plants for which concessions are deprived present good examples for finding issues in procedures, i.e. parts of procedure that should be better defined. Concession Agreement presents basic legal document which, in accordance with legal framework, defines relation between concessionaires and grantor, mutual responsibilities and obligations.

Concession Agreements that currently define projects of sHPP in Montenegro, put the risk of connection as well as hydrology on concessionaire, and grantor is responsible to provide concessionaire using of public goods to which concession is obtained, i.e. water. However, in situation where concessionaire withdrew from the concession due to non-profitability of the project, i.e. additional information for the availability and amount of hydrological potential, agreements are mutually terminated and the concessionaire was not charged by bank guarantee. Therefore, it is assumed that from the legal aspect these obligations of concessionaires and grantors are not clearly defined by the Agreement.

Also, in situations such as an example of project of sHPP on watercourse Grlja, where local population is against construction of sHPP, legal responsibility remains unclear and project is in intermediate stage with unclear further steps.

As previously defined, technical documentation of project is defined in a manner of using water potential as well as boundaries within which this action ranges in nature, i.e. amount of water used. By signing the Annex of existing Agreements as well as new Concession Agreements, generally defined possibility of change of technical solution was left, if optimal solution is found. From the aspect of environmental impact assessment of sHPP as well as on water management, it is necessary to clearly define deadlines by the Concession Agreement within which it will be possible to change technical solution, conditions that must be fulfilled and institutions that must be informed about the changes of technical solutions. Besides, it is necessary to define whose responsibility is to inform institutions about such changes.

In this way, projects of using water potential with the aim of construction of sHPP would be more transparent and monitoring would be easier. Finally, quality Concession Agreements would ensure sustainable use of natural resource and impossibility of blocking this resource to unrealistic projects.

Conclusion: Existing Concession Agreements unclearly define obligations and responsibilities of contracted parties, and therefore opinion of lawyers are often requested with the aim of interpretation of Agreement.

Solution Proposal: It is necessary to closely and clearly define responsibilities of concessionaires and grantors by the Concession Agreements, and especially when it comes to issues that led to termination or issues in implementation of the Agreement in so far implementation.

6. Poor capacity of institutions responsible for management of water and energy resources

Water management and energy present one of basis of development of every society. In Montenegro, this is even more expressed considering that water presents one of the most important resources of Montenegro, while electricity production significantly affects economic situation of Montenegro. Given that electricity production is 70% based on production from hydropower plants, connection and importance of these two fields is clear. Besides, Montenegro committed itself on status of ecological state in 1991 [26], and therefore environmental protection, sustainable development, water management and energy are basis of further development.

With improvement of technologies, many possibilities for greater use of natural resources are opening, even possibility and need for electronic geographical mapping of resources by GIS, as well as monitoring of state of quality and amount. On the basis of previously mentioned, it is clear that through the reference to EU policy, as well as adoption of its own laws, Montenegro committed itself to owning water basis and digital information system. These basis are necessary for planning and development of water management. Only by regular monitoring and sustainable water management, quality life of citizens of Montenegro can be enabled, as well as to save good quality of environment.

The Law on Water was adopted in 2007 and until today, 2015, defined obligations of adoption of water management basis and plans are not met. It is clear that in the sector of water management it is necessary to raise capacities, through qualification of personnel, as well as through attracting and recruiting of new professionals. In that sense, it is very important to include this sector in international projects and train employees to use possibility of international and EU funds for attracting assets for faster development of this sector. Water management was defined as one of basic fields planned for financing through preaccession IPA funds for Montenegro [27]. Besides, exchange of experiences is required, not only in countries that have historically organized systems of water management, but in countries that are in phases of organization of this sector such as Montenegro.

Water management in Montenegro can not sustainably develop without adequate qualified staff and institution which will provide hydrological measurement, monitor the use and management of water with the aim of maintenance the quality and development of the most important resource.

On the other side, field of energy presents field that is constantly changing. Renewable energy sources are increasing in the last few decades in the EU, and in Montenegro from the formation of

Energy Community. Renewable energy sources are characteristic due to they enable use of natural resources in a manner which generally less threatens environment than conventional sources. Specific technologies develop faster than others. Even in the fields within which technology is developed and verified, such as sHPP, we can find new technical knowledge, defining of protocol and manners of realization of sHPP in order to create less impact on environment. Policy of the EU in the field of energy is constantly improving, but its implementation through harmonization with directives is often left to the member countries with the aim of optimal implementation depending on local conditions. This field requires organization of group of local experts from different fields in order to quality plan and implement on local conditions in Montenegro.

Energy Development Strategy by 2030 was adopted in 2014 and it is based on data from energy sector from 2010. For energy sector, four-year period presents important period within which important changes occur on the global level, not only in politics, but also in technologies. In the period from 2010 to 2014, important changes in the aspect of consumption of electricity occur in Montenegro. Action plan of implementation of the Strategy which is adopted on the period of five years terminated in 2012. New five-year action plan is not yet adopted, and if it relied on data from the current Strategy, data from 2010 would be used, and which are today irrelevant. Besides, Energy Development Strategy does not provide clear guidelines of development of small energy sector of Montenegro, but it provides new possibilities of development from chapter to chapter that would mean complete change of sector related to previously defined.

Then, National Action Plan of renewable energy sources, developed in the form of NREAP, on the basis of obligational program of usage and development of renewable energy sources defined by the Law on Energy was adopted on the period from six, and not on ten years as defined by the Law. In this way, implementation is more and more away from obligations defined by the Law and therefore reduces the importance of that Law.

Finally, from the aspect of sHPP, NREAP which defines development of sHPP, as mentioned in the Chapter 2, defines capacities by 2020 that are approved already in 2015. On the other hand, development of other technologies of renewable energy sources is also ambitiously defined, and activities in these fields do not follow defined.

According to the valid strategic documents and related action plans it is clear that for planning, monitoring and development of energy sector in Montenegro it is necessary significantly increase of human resources, through cooperation with experts from academic and research institutions, as well as through gathering of numerous experts for everyday work in this field. For defining concrete steps for increase of capacity, detailed analysis of existing human resources in these fields is necessary.

Conclusion: It is necessary to raise capacities of water management sector as well as energy sector in order to meet legally defined obligations.

Solution Proposal: Define short-term and long-term plan of increase capacities in the fields of water management and energy, if successful and sustainable economic development is expected by using these fields.

7. Monitoring, review and quality defining of strategic objectives in the field of energy

The Law on Energy defines obligation of adoption of energy policy, strategy of energy development and action plans. The Law also defines regular monitoring of implementation and achieving of defined objectives and activities by submitting annual report to the Government of Montenegro. Lack of these reports in previous years leads to more serious monitoring and irrelevance of defined objectives.

Besides, Energy Development Strategy by 2025 was adopted in 2007. Energy Development Strategy by 2030 which was adopted in 2014, did not analyze previously defined objectives and dynamics of development, as well as reasons of failure to reach or to achieve these objectives. Lack of monitoring and review of objectives lead to adoption of strategies that present only declarative form. Such defined strategies that do not bind for previous or following activities in sector do not oblige and do not encourage launching of activities in industry and academy of that sector.

It is necessary to establish annual monitoring of implementation of the Strategy and following action plans. Transparency of this process and involvement of public can be achieved through digital system of monitoring of defined objectives and current progress. Only through regular monitoring, development of energy sector can be controlled, and timely redirect due to new circumstances, technological development, changes on global market, etc.

From the aspect of strategic planning of development of sHPP, sHPP are defined in energy strategic documents as well as in legal framework as distribution energy source and smaller producers. Starting the operation of newly constructed sHPP, in Berane and Bijelo Polje, six sHPP of installed capacity of 8,8 MW are connected to the power system. If peak power consumption of the city of Bijelo Polje is analyzed, this production meet these needs more than needed [28].

Existing strategic documents from the field of energy do not enter the concept of development of sHPP, nor from the aspect of their synchronization with existing consumption, improvement of power system or increase of security of network on locations where important development of industry is planned. Average installed capacity of approved sHPP is 2 MW for Montenegro and it is clear that, by superficial analysis of consumption of the northern part of Montenegro, 2 MW for Montenegro presents important source. None of existing strategic documents or national studies does not analyze cost-effectiveness, i.e. sustainability of development of numerous sHPP of installed capacity of 1 MW, or support of development of micro hydropower plant [29], compared with the development of sHPP of larger capacities, 1-10 MW. During tender procedure, projects on the basis of criteria of maximum use of resource, i.e. higher production of electricity are approved. Therefore, currently there is no strategic planning of development of sHPP.

Development of sHPP must be planned, not only in overall amounts from the aspect of meeting overall energy consumption, but also geographically, from the aspect of improving power system and production on places of consumption.

Conclusion: Obligations of monitoring over implementation of the Strategy and Action Plan in accordance with the Law on Energy are not implemented. During defining new objectives and deadlines, earlier defined objectives and deadlines are not questioned.

Solution Proposal:

- **Development of annual report of implementation of strategy and action plan every year.**
- **Forming active system of monitoring of implementation of energy strategy, if not by state administration, then by non-government sector.**
- **Review of current activities and defining concrete and measurable objectives of energy development, if not by the amendment of existing Strategy, then by preparation of quality and relevant five-year action plan in accordance with the Law on Energy.**

8. Preventing the allocation of responsibilities/control of procedure to one institution

Countries of the EU require more institutions that are directly related to energy, water management or environment to involve in the process of approving projects of sHPP. In France, requirement for approving is submitted to one institutions that calls upon team of experts during issuing permit for using water, as well as during issuing construction permit.

Institutions must be specialized for specific part of sector, such as hydrology, planning of development of energy sector, power system, water management, construction of facilities, etc. However, in cases where important strategic documents are missing and direction of development is not defined, transparent methodologies for defining characteristics of projects, opinions of relevant institutions responsible for that field become bottleneck. In that way, non-transparent and subject to interest step in procedure is developed, that can affect not only the efficiency of procedure, but also quality of approved projects.

Good environment for development of sHPP, i.e. overall energy presents system in which possible locations and conditions for its usage are clearly defined, steps in procedure and their duration and finally financial framework of specific phases of preparation and approving the projects.

Lack of watercourse cadastre, with defined locations, hydrological, economical and energy characteristics, as well as dynamics of using specific locations present basic barrier towards sustainable development of sHPP. Therefore, there is possibility of subjective defined control of procedure of sHPP in terms of approving projects by institutions dealing with hydrology, environment or energy.

Therefore, to define watercourse cadastre as defined in the issue 2, by which criteria and conditions for usage of specific location are defined, forming of team of experts with representatives from institutions responsible for energy, power system, water management, hydrology, environmental protection and construction is proposed, who would analyze submitted projects and jointly decide on approving projects and concession allocation. In that way, basic deficiencies of project would be defined in the first step, i.e. in intersectoral way we would approve that only those projects that have a chance for implementation in further procedure in accordance with criteria defined by relevant laws and regulations.

Conclusion: Clearly defined steps of procedure do not exist, i.e. criteria for approving projects of sHPP, from the aspect of energy, hydrology, etc. and methodologies that are used for calculation of these criteria.

Solution proposal: By the adoption of cadastre, it is necessary to define in the first step of approval publicly available criteria for approving projects of sHPP from the aspect of using available water, environmental impact and integration into the existing power system.

9. Greater involvement of public during planning/approving projects

In existing procedure of sHPP public is involved in several steps, as follows:

- Public discussion for proposed concession act, if the state announces tender;
- Possibility of sending comments on submitted request for energy permit and
- Public discussion on location with local population before adoption of approval on environmental impact assessment for sHPP of installed capacity over 1 MW.

Of course, public can involve in the procedure of adoption of strategy or action plan, but can define only dynamics of increase of installed capacity and produced energy from all sHPP, but not concrete location as well.

Therefore, from the aspect of local population, they are facing with the sHPP project for the first time, unless installed capacity is over 1 MW, in the process of obtaining ecological compliance for project, when concessionaire has already defined the manner of use of location and water. That kind of project local population does not consider as its own, but more as project that was imposed. In most cases, when it comes to sustainable manner of using waters, local population and investor cooperate and define solutions that is appropriate for all sides. However, involvement of local population would be more useful, not only during defining technical solution, but also during defining amount and quality of water and part of watercourse that should be used, and especially due to lack of official water cadastre.

Project of sHPP Grlja presents classic example of disagreement of local population with permit allocated to the investor by the state of Montenegro with the right of using water for construction of hydropower plant. Such examples are rare but should be improved by quality planning.

When it comes to projects of sHPP of installed capacity below 1 MW, public gets familiar with the project only during the submission of requests, when the request is published on website for renewable energy sources [15]. As earlier mentioned, this request is published in a very non-transparent way. Therefore, public gets familiar with the project of sHPP of installed capacity up to 1 MW only when the implementation of project starts, and when it is not possible to react and improve sustainability of the very project.

Conclusion: Process of defining watercourse on which construction of sHPP is planned, allocation of approval and concessions for projects of sHPP as well as technical solutions for using water potentials are non-transparent and more involvement of public is necessary.

Solution proposal: Prepare and adopt development plan of sHPP on the period of three years.

10. Compliance of strategic plans and harmonization of policies of energy, water management, environment, spatial planning and construction sectors

Distribution sources, among which are sHPP, are implemented on smaller locations on areas that are used for different purposes. These energy facilities in some way fit in the rest of environment and area and therefore are involved in different areas of planning. This principle of fitting into the surrounding space is what makes distribution sources, and especially renewable energy sources more attractive.

However, during approval of that project, compliance of spatial planning sector, power infrastructure, environment, impact on monuments, traffic etc should be obtained. Development strategy of these sector should recognize possibility of installation of such energy facility in the concept of their development.

In order to development and approval procedure of sHPP be effective and enable approval of the very project which help sustainable development and present economic improvement, strategy of energy and other fields must mutually agree. If they are not mutually agreed, only projects that present optimal projects from the aspect of energy use of resources and technologies, and which can produce negative impact on other sectors can be approved. In this way, dilemma of priority of one sector over the other comes up while sustainable solution presents compromise solution.

Solving of such issues during implementation of projects leads to delay and financially demanding procedures. If compliance of sectors and needed criteria solve during defining of strategy and action plans, strategy and action plans are easily implemented and transmitted to concrete projects, not only as option, but also as a manner of development.

Conclusion: Development of sHPP, as distribution source is not compiled with development of other sectors.

Solution proposal: Strategic planning of development of distribution sources and sHPP should include other sectors, as this sector should be included during defining water use, environmental protection, spatial planning, etc.

V Conclusion

Study gives the analysis of implementation process of sHPP in Montenegro, with special focus on planning and approving phases. Ten main issues are defined, with solution proposals. Solving these issues presents basic steps towards improvement of procedure and harmonization of development process of sHPP in Montenegro with sustainable development, supported by EU. In Table 6, review of these issues and proposed solutions is given.

Table 6. Review of defined issues with solution proposals

Serial Number	Issue	Solution proposal
1	Lack of water management basis	Prepare and adopt water management basis and other water management basis as soon as possible
2	Lack of cadastre of watercourses with environmental and energy characteristics	Expand existing Cadastre of small watercourses with hydrological data and data on state and need for environmental protection, including ecological and hydromorphological status of water body, in order to develop cadastre of watercourse for construction of sHPP with energy and ecological criteria
3	Lack of annual or years-long planning of dynamics of using watercourses for energy purposes	Define obligation of preparation of development plan of sHPP for period of three years by the Law on Energy. This plan would define which watercourses are planned to use, in which framework capacities for meeting objectives of dynamics of increase of sHPP capacity from Strategy and NREAP
4	Inconsistency of legal regulations or their implementation	Define and implement list of approvals needed for approving construction of energy facilities in quality and sustainable manner
5	Insufficiently clear defining of responsibilities of concessionaires and grantor	It is necessary to closely and clearly define responsibilities of concessionaires and grantor by the Concession Agreement, especially when it comes to issues that led to termination or implementation issues of the Agreement in so far implementation.
6	Low capacity of institutions responsible for management of water and energy resources	Define short-term and long-term plan of increase of capacity in the fields of water management and energy, if successful and sustainable economic development is expected by using these fields
7	Monitoring, review and better defining of strategic objectives in the field of energy	– Preparation of annual report of implementation of strategy and action plan every year

		<ul style="list-style-type: none"> – Forming of active system of monitoring of implementation of energy strategy, if not by state administration, then by non-governmental sector. – Review of current activities and defining concrete and measurable aims for energy development, if not by changing existing Strategy, then by preparing quality and relevant five-year action plan in accordance with the Law on Energy
8	Preventing the allocation of responsibility/control of procedure to one institution	By the adoption of cadastre, it is necessary to define publicly available criteria for approving the projects of sHPP in the first step of approval, from the aspect of using available water, environmental impact and integration into existing power system
9	Greater involvement of public during planning/approving the projects	Prepare and adopt development plan of sHPP on the period of three years
10	Compliance of strategic plans and harmonization of policies of energy, water management, environment, spatial planning and construction sectors	Strategic planning of development of distribution sources and sHPP should include other sectors as well, as this sector should be included during defining manner of water use, environmental protection, spatial planning, etc.

Analysis of current state of projects of sHPP shows that currently there is lack of basis, strategic planning of manner of development of sHPP in Montenegro, connecting development plans of energy sector with sectors of water management, environment, spatial planning and construction of facilities, as well as clearly defined steps, criteria, time and financial framework of approval process of sHPP. Lack of strategic documents, action plans, basis and supervision over monitoring implementation of defined aims indicates to the lack of human resources in key institutions dealing with energy and water management. On the other hand, in such framework implementation of projects of sHPP takes place, that are not accompanied by sufficient analysis of their impact on overall energy system, as well as harmonization of development guidelines.

Projects of sHPP present renewable energy source that can help sustainable development through distribution production at the point of consumption, with minor negative impact on environment and space. However, during planning of these facilities, existing consumption, distribution and state of infrastructure, need for development of specific geographical areas, existing use, vulnerability and quality of water and environment. Only with such planning, constant supervision over implementation and its impact of existing situation, review of defined objectives and clear guidelines of development it can be said that sHPP are developing in sustainable direction.

Solutions of issues are proposed through:

Steps towards sustainable development of small hydropower plants in Montenegro

- Implementation of existing legal obligations defined by the Law on Water, the Law on Energy and the Law on Concessions;
- Adoption of new strategic documents which define constraints, conditions and short-term dynamics of implementation of sHPP through publicly available Watercourse Cadastre and Development Plan of sHPP;
- Redefining and clearly defining of legal solutions, regulations and agreements, especially when it comes to synchronisation of the Law on Spatial Planning and Construction with other Laws relevant for construction of energy facilities and clearer defining of rights and obligations from the Concession Agreement;
- Realistic strategic planning based on updated and quality data, as well as improving of intersectoral strategic planning;
- Improving of cooperation among sectors during planning and approving of projects of sHPP and
- Increase capacity of institutions responsible for strategic planning, approving, supervision and management of water and energy.

NGO Green Home, with support of WWF, is planning as so far, to support state institutions, through defining deficiencies, possibility to overcome these deficiencies and realization of solutions, towards sustainable development of energy and water management. This study presents analysis of state on the basis of which further steps and directions of our activities are defined.

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ANNEX 1

Review of approved projects for construction of sHPP according to the procedures of approval

Serial Number	Name of watercourse	Municipality	Concessionaire	Date of signing the Agreement	Subject of concession	Number of sHPP	Name of sHPP	Installed capacity [MW]	P [MW]	E [GWh]
I tender										
1	Bistrica	Berane	Hydroenergija Montenegro d.o.o.	26.09.2008.	Watercourse Bistrica	5	Bistrica	5,10	14,90	39,85
							Jelovica 1	3,01		
							Jelovica 2	0,80		
							Jezerštica	0,84		
							Konjska rijeka 2	0,89		
2	Šekularska rijeka	Berane	Hydroenergija Montenegro d.o.o.	26.09.2008.	Watercourse Šekularska rijeka	4	Orah	1,17	3,95	16,80
							Rmuš	0,48		
							Spaljevići 1	0,61		
							Šekular	1,71		
3	Crnja	Kolašin	Dekar d.o.o.	26.09.2008.	Watercourse Crnja	3	Crnja	2,98	5,38	15,11
							Crni potok	0,40		
							Ljubaštica	2,01		
4	Grlja	Gusinje	ECG Energy Zotter	26.09.2008.	Watercourse Grlja	1	Grlja	3,00	3,00	5,70
5	Babinopoljska rijeka	Plav	Kroling d.o.o.	26.09.2008.	Watercourse Babinopoljska rijeka	2	Babinopolje	2,12	7,09	22,61
							Jara	4,57		

Overall I tender									15	34,32	100,07
Serial Number	Name of watercourse	Municipality	Concessionaire	Date of signing the Agreement	Subject of concession	Number of sHPP	Name of sHPP	Installed capacity [MW]	P [MW]	E [GWh]	
II tender											
6	Trepачka	Andrijevica	Dekar Hidro d.o.o.	17.09.2010.	Watercourse Trepачka rijeka	2	Trepачka 1	9,60	11,80	33,18	
							Trepачka 2	2,19			
7	Murinska rijeka	Plav	Elektrotehna Radius d.o.o.	17.09.2010.	Watercourse Murinska rijeka	2	Murinska rijeka	1,13	2,07	8,30	
							Dosova rijeka i Nenov potok	0,90			
8	Komarača	Plav	Kroling d.o.o.	30.09.2010.	Watercourse Komarača	1	Meteh	4,08	4,08	10,60	
Overall II tender									5	17,95	52,08
III tender											
9	Bistrica	Bijelo Polje	Konzorcijum Hydro Bistrica	23.04.2014.	Watercourse Bistrica	1	Bistrica	3,49	3,49	11,32	
10	Đurička rijeka	Plav	Konzorcijum Plava Hidro Power	23.04.2014	Watercourse Đurička rijeka	2	Đurička 1	1,69	3,97	12,61	
							Đurička 2	2,20			
11	Vrbnica	Plužine	Konzorcijum Hidroenergo	23.04.2014.	Watercourse Vrbnica	2	Vrbnica 1	2,20	5,35	20,30	
							Vrbnica 2	3,10			
12	Kaludarska rijeka	Berane	Hidroenergija Montenegro d.o.o.	23.04.2014.	Watercourse Kaludarska rijeka	1	Kaludara	1,05	1,05	5,50	

Overall III tender									6	13,86	49,73
Serial Number	Name of watercourse	Municipality	Concessionaire	Date of signing the Agreement	Subject of concession	Number of sHPP	Name of sHPP	Installed capacity [MW]	P [MW]	E [GWh]	
IV tender											
13	Kutska rijeka	Andrijevića	Konzorcijum Kutska i Mojanska	05.12.2014.	Watercourse Kutska rijeka	1	Kutska	2,49	2,49	11,60	
14	Mojanska rijeka	Andrijevića	Konzorcijum Kutska i Mojanska	05.12.2014.	Watercourse Mojanska rijeka	3	Mojanska 1	2,60	6,10	22,70	
							Mojanska 2	2,60			
							Mojanska 3	0,86			
Overall IV tender									4	8,59	34,30
Overall tender procedure									30	74,72	236,18
Energy permit											
15	Raštak	Kolašin	Kol Energy	28.03.2012.	Raštak 870 - 660 mnm	1	Raštak 1	0,62	0,62	2,50	
16	Vrelo	Bijelo Polje	Synergy	06.06.2012.	Vrelo 831 - 734 mnm	1	Vrelo	0,61	0,61	2,35	
17	Ljeviška rijeka	Kolašin	Dekar	29.06.2012.	Ljeviška rijeka 1280 - 1050 mnm	1	Ljeviška rijeka - izvor Morače	0,98	0,98	3,32	
18	Bradavec	Andrijevića	Igma energy d.o.o.	11.2.2013.	Bradavec 1170 - 918 mnm	1	Bradavec	0,95	0,95	3,38	
19	Raštak	Kolašin	Kol Energy	24.04.2014.	Raštak2 660 - 450 mnm	1	Raštak 2	0,62	0,62	2,50	
20	Piševska rijeka	Andrijevića	Igma Grand	28.01.2014.	Piševska rijeka 1150 - 785 mnm	1	Piševska rijeka	0,95	0,95	3,53	

Serial Number	Name of watercourse	Municipality	Concessionaire	Date of signing the Agreement	Subject of concession	Number of sHPP	Name of sHPP	Installed capacity [MW]	P [MW]	E [GWh]
21	Reževica rijeka	Budva	Radoslav Kovacevic	02.03.2014.	Reževića rijeka 74,5 - 11,5 mnm	1	Reževića rijeka	0,95	0,95	3,20
22	Paljevinska rijeka	Kolašin	Viridi Prograssum d.o.o.	Energy permit still not signed 30.12.2014.	Paljevinska rijeka 1310 - 1130 mnm	1	Paljevinska	0,54	0,54	2,10
23	Pecka rijeka	Kolašin	Djekic d.o.o.	Energy permit still not signed 09.02.2015.	Pecka rijeka 1140 - 1030 mnm	1	Pecka	0,41	0,41	1,80
24	Rijeka Ljevak	Mojkovac	Simes inzenjering d.o.o.	Energy permit still not signed 02.03.2015.	Rijeka Ljevak 868 - 765 mnm	1	Ljevak	0,55	0,55	2,51
25	Tustički potok	Kolašin	MN Energy Plus d.o.o.	Energy permit still not signed 16.03.2015.	Tustički potok 1050 - 737 mnm	1	Ocka Gora	0,50	0,50	2,18
26	Tustički potok	Kolašin	MN Energy Plus d.o.o.	Energy permit still not signed 16.03.2015.	Tustički potok 730 - 590 mnm	1	Jasicje	0,56	0,56	2,24

27	Rijeka Slatina	Kolašin	BB Hidro d.o.o.	Energy permit still not signed 11.05.2015.	Slatina 729 - 510 mnm	1	Slatina	0,45	0,45	1,22
Overall energy permits for which concessions are allocated						7			5,68	20,77
Overall energy permits						13			8,69	32,82
Overall sHPP projects for which concessions are allocated						37			80,40	256,95
OVERALL APPROVED SHPP PROJECTS						43			83,40	269,00

ANNEX 2

Review of approved projects for construction of sHPP according to municipalities

Serial Number	Municipality	Watercourse	Concessionaire	Number of sHPP	P [MW]	E [GWh]
1	Kolašin	Crnja	Dekar d.o.o.	3	5,4	15,1
2		Raštak	Kol energy	1	0,6	2,5
3		Ljeviška rijeka	Dekar d.o.o.	1	1,0	3,3
4		Raštak	Kol energy	1	0,6	2,5
5		Paljevisnka rijeka	Viridi Prograssum d.o.o.	1	0,5	2,1
6		Pecka rijeka	Djekic d.o.o.	1	0,4	1,8
7		Tustički potok	MN Energy Plus d.o.o.	1	0,5	2,2
8		Tustički potok	MN Energy Plus d.o.o.	1	0,6	2,2
9		Rijeka Slatina	BB Hidro d.o.o.	1	0,5	1,2
Overall Kolašin				11	10,1	33,0
1	Mojkovac	Rijeka Ljevak	Simes inzenjering d.o.o.	1	0,6	2,5
Overall Mojkovac				1	0,6	2,5
1	Andrijevića	Trepačka	Dekar Hidro d.o.o.	2	11,8	33,2
2		Kutska rijeka	Konzorcijum Kutska i Mojanska	1	2,5	11,6
3		Mojanska rijeka	Konzorcijum Kutska i Mojanska	3	6,1	22,7
4		Bradavec	Igma energy d.o.o.	1	1,0	3,4
5		Piševska	Igma grand d.o.o.	1	1,0	3,5
Overall Andrijevića				8	22,3	74,4
1	Berane	Bistrica	Hidroenergija Montenegro d.o.o.	5	14,9	39,9
2		Šekularska rijeka	Hidroenergija Montenegro d.o.o.	4	4,0	16,8
3		Kaludarska rijeka	Hidroenergija Montenegro d.o.o.	1	1,1	5,5
Overall Berane				10	19,9	62,2
1	Bijelo Polje	Bistrica	Konzorcijum Hydro Bistrica	1	3,5	11,3
2		Vrelo	Synergy	1	0,6	2,3
Overall Bijelo Polje				2	4,1	13,7
1	Plav	Babinopoljska rijeka	Kroling d.o.o.	2	7,1	22,6
2		Komarača	Kroling d.o.o.	1	4,1	10,6
3		Murinska rijeka	Elektrotehna radius d.o.o.	2	2,1	8,3
4		Đurička rijeka	Konzorcijum Plava Hidro Power	2	4,0	12,6

Overall Plav				7	17,2	54,1
Serial Number	Municipality	Watercourse	Concessionaire	Number of sHPP	P [MW]	E [GWh]
1	Gusinje	Grlja	ECG Energy Zotter	1	3,0	5,7
Overall Gusinje				1	3,0	5,7
1	Plužine	Vrbnica	Konzorcijum Hydroenergo	2	5,4	20,3
Overall Plužine				2	5,4	20,3
1	Budva	Reževića rijeka	Radoslav Kovačević MEII d.o.o.	1	1,0	3,2
Overall Budva				1	1,0	3,2

ANNEX 3

Review of approved projects for construction of sHPP according to implementation phases

Serial Number	Start phase date	Watercourse	Municipality	Name of sHPP	P [MW]	E [GWh]
Phase of approving concession						
1	30.12.2014.	Paljevisnka rijeka	Kolašin	Paljevinska	0,54	2,10
2	09.02.2015.	Pecka rijeka	Kolašin	Pecka	0,41	1,80
3	02.03.2015.	Rijeka Ljevak	Mojkovac	Ljevak	0,55	2,51
4	16.03.2015.	Tustički potok	Kolašin	Ocka Gora	0,50	2,18
5	16.03.2015.	Tustički potok	Kolašin	Jasicje	0,56	2,24
6	11.05.2015.	Rijeka Slatina	Kolašin	Slatina	0,45	1,22
Overall phase of approving concession					3,01	12,05
Phase from Agreement to issuing UTC						
1	23.04.2014	Đurička rijeka	Plav	Đurička 1	1,69	12,61
2	23.04.2014	Đurička rijeka	Plav	Đurička 2	2,20	
3	23.04.2014.	Vrbnica	Plužine	Vrbnica 1	2,20	20,30
4	23.04.2014.	Vrbnica	Plužine	Vrbnica 2	3,10	
5	23.04.2014.	Kaludarska rijeka	Berane	Kaludara	1,05	5,50
6	05.12.2014.	Kutska rijeka	Andrijevisa	Kutska	2,49	11,60
7	05.12.2014.	Mojanska rijeka	Andrijevisa	Mojanska 1	2,60	22,70
8	05.12.2014.	Mojanska rijeka	Andrijevisa	Mojanska 2	2,60	
9	05.12.2014.	Mojanska rijeka	Andrijevisa	Mojanska 3	0,86	
10	24.04.2014.	Raštak	Kolašin	Raštak 2	0,62	2,50
11	28.01.2014.	Piševska rijeka	Andrijevisa	Piševska	0,95	3,53
Overall phase of Agreement by issuing UTC					20,36	78,74
Issuing construction permit phase						
1	24.03.2011	Bistrica	Berane	Jelovica 1	3,01	10,27
2	24.03.2011	Bistrica	Berane	Jelovica 2	0,80	
3	13.01.2011.	Grlja	Gusinje	Grlja	3,00	5,70
4	22.11.2013.	Murinska rijeka	Plav	Murinska rijeka	1,13	8,30
5	22.11.2013.	Murinska rijeka	Plav	Dosova rijeka i Nenov potok	0,90	
6	09.10.2012.	Komarača	Plav	Meteh	4,08	10,60

Serial Number	Start phase date	Watercourse	Municipality	Name of sHPP	P [MW]	E [GWh]
7	05.06.2014.	Bradavec	Andrijevica	Bradavec	0,95	3,38
8	10.04.2014.	Reževića rijeka	Budva	Reževića rijeka	0,95	3,20
Overall issuing construction permit phase					14,81	41,46
Construction phase						
1	05.06.2014.	Bistrica	Berane	Konjska rijeka 2	0,89	2,40
2	04.05.2015.	Šekularska rijeka	Berane	Šekular	1,71	7,27
3	09.12.2011.	Crnja	Kolašin	Crnja	2,98	15,11
4	09.12.2011.	Crnja	Kolašin	Crni potok	0,40	
5	09.12.2011.	Crnja	Kolašin	Ljubaštica	2,01	
6	19.07.2013.	Babinopoljska rijeka	Plav	Babinopolje	2,12	22,61
7	23.07.2013.	Babinopoljska rijeka	Plav	Jara	4,57	
8	03.12.2013.	Trepačka rijeka	Andrijevica	Trepačka 1	9,60	33,18
9	28.10.2014.	Trepačka rijeka	Andrijevica	Trepačka 2	2,19	
10	16.03.2015.	Bistrica	Bijelo Polje	Bistrica	3,49	11,32
11	08.08.2013.	Raštak	Kolašin	Raštak 1	0,62	2,50
12	03.09.2014.	Ljeviška rijeka	Kolašin	Ljeviška rijeka-izvor Morače	0,98	3,32
Overall construction phase					31,56	97,70
Exploitation phase						
1	10.10.2013.	Bistrica	Berane	Jezerštica	0,84	2,28
2	30.04.2015.	Bistrica	Berane	Bistrica	5,10	13,77
3	27.04.2015.	Šekularska rijeka	Berane	Orah	1,17	4,97
4	30.04.2015.	Šekularska rijeka	Berane	Rmuš	0,48	2,05
5	27.04.2015.	Šekularska rijeka	Berane	Spaljevići 1	0,61	2,61
6	14.05.2015.	Vrelo	Bijelo Polje	Vrelo	0,61	2,35
Overall exploitation phase					8,82	28,02

ANNEX 4

Review of Concession Agreements that are terminated

Serial Number	Watercourse	Municipality	Concessionaire	Number of SHPP	P [MW]	E [GWh]	The date of signature of the Concession Agreement	The implementation stage at the termination of the Agreement	The date of termination of the Agreement	The reason for termination of the Agreement
1	Bistrica	Bijelo Polje	Hider Extrem Energy	2	17	50	26.09.2008.	Construction phase	Agreement was terminated by a declaration of termination on 14th June 2013. Statement of termination was unilaterally signed only by the Ministry of Economy.	Agreement was terminated due to failure to submit bank guarantee for III phase in accordance with Annex 2 signed on 9th April 2013
2	Bjelojevička rijeka	Mojkovac	Hider Extrem Energy	2	15	48	26.09.2008.	Construction phase	Agreement was terminated by a declaration of termination on 14th June 2013. Statement of termination was unilaterally signed only by the Ministry of Economy.	Agreement was terminated due to failure to submit bank guarantee for III phase in accordance with Annex 2 signed on 9th April 2013
3	Zaslapnica	Nikšić	Bast d.o.o.	2	1	3,6	26.09.2008.	Phase of issuing construction permit	Agreement was terminated by mutual agreement on 25th June 2014. Bank guarantee was not charged.	Agreement was terminated due to non-profitability of project due to high costs of connecting to the electricity system.

Serial Number	Watercourse	Municipality	Concessionaire	Number of SHPP	P [MW]	E [GWh]	The date of signature of the Concession Agreement	The implementation stage at the termination of the Agreement	The date of termination of the Agreement	The reason for termination of the Agreement
4	Vrbnica	Plužine	Konzorcijum "mHIDRO" Montenegro - Slovenia	2	12	27,4	23.09.2010.	Implementation of Agreement did not start because phase I did not start- problems in consortium	The Government brought the conclusion that the Agreement should be terminated on 19th January 2012. The Agreement was terminated by the Declaration on 21st February 2013. Statement of termination was unilaterally signed only by the Ministry of Economy. Bank guarantee was charged on 8th February 2012.	Concession company is not formed by all members of consortium in accordance with the Concession Agreement

5	Tušina	Šavnik	Kroling d.o.o.	4	6	16,5	30.09.2010.	Implementation of Agreement did not start because concessionaire did not submit documentation for issuing Urban Technical Conditions in accordance with conclusion of the Government of Montenegro	The Government brought a conclusion on termination of the Agreement on 4th April 2013. The Agreement was terminated by mutual agreement on 12th April 2013. Bank guarantee was not charged.	There is no explanation in legal act, but reasons are given in information that followed proposal of Agreement and which went to the Government on 4th April 2013.
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ANNEX 5

Meetings with representatives of stakeholders

Institution/Company	Representatives	Date
Insight into Concession Agreements with appendix		
Ministry of economy	Ana Asanović, Maja Bogavac and Nevena Kaluđerović	17.-18.02.2015.
Meetings		
FC Distribution, EPCG (Power Company)	Ranko Vuković	16.04.2015.
Ministry of sustainable development and tourism	Danilo Gvozdrenović,	16.04.2015.
Environmental protection Agency	Ilija Radović	16.04.2015.
Kronor d.o.o.	Saša Saveljić	17.04.2015.
ECG Energy Zotter	Denis Hot	17.04.2015.
Directorate for water management	Radosav Rašović	17.04.2015.
Hydroenergija Montenegro d.o.o.	Danilo Pavićević	20.04.2015.
Ministry of economy	Maja Bogavac, Danilo Barjaktarević	20.04.2015.

Roundtables with organized discussions with present stakeholders from government institutions, NGOs and private sector dealing with hydropower in Montenegro.

Name of the roundtable	Place where roundtable is held	Date
„Impact of sHPP on environment and sustainable hydropower “	Hotel „Podgorica“, Podgorica, Montenegro	15.04.2015.
„Sustainable hydropower and impact of sHPP on environment“	EU info centar, Podgorica, Montenegro	16.06.2015.